MODERN PLASTICS

DECEMBER 1949

It pays to use your custom molder's know-how

"Small" details, a big field for design improvement

No. 12 in a series on Plastics Skill at Work...

PROJECT:
Legs for new model "Popex" popcorn popper
CUSTOMER:
Popex, Inc., Blue Ash, Ohio
MOLDER:
Plastics Moldings Corp. Cincinnati
MATERIAL:
Durez black phenolic, general-purpose grades

BEFORE restyling, the Popex Electric Corn Popper stood on 3-piece metal legs. But Popex, Inc., executives recognized in this minor detail an opportunity for major improvement. With the objectives of neater appearance, less heat transmission and, if possible, lower costs, engineers of Popex, Inc., and Plastics Moldings Corp. cooperated in redesigning the leg as a plastics molding.

AFTER restyling, the leg was molded in one piece of Durez general-purpose black phenolic. The natural lustrous finish and smooth contours of the new piece make the appliance more attractive to buyers. Durez legs stay "cool" when the stove is hot . . . it's safer and easier to pick up. Cost is down: assembly of the three old-style legs took 19 operations, Durez legs are attached in only 6.

"Minor" features are not always *minor*. This before-and-after story of the legs supporting an electrical appliance illustrates how a small detail and the right Durez plastic can go a long way in making a product easier to sell, easier to use, and less expensive to produce.

Many articles used by industry or in homes offer improved design opportunities of the kind Popex, Inc., saw in the legs of their corn popper.

As often happens, success-insurance lay in joint effort. Custom-molders contribute a lot more than production facilities toward the success of the job. These molders recommended sections and contours providing the maximum strength with the greatest economy. Thus, by using Durez 791 general-purpose phenolic, which is used also for the handles and knobs, cost was reduced while sales appeal was added.

Durez phenolics offer your engineers and molders a very broad range of materials. These are grouped in eight classes corresponding to the field of use in which they will give the best service. Your custom molder knows how to choose the right one and how to use it.

Durez technicians in leading cities are always available for consultation. Call them . . . or write us at any time.

A new hit with plastics users everywhere is the handy "Durez Check-Chart." Write for yours. Durez Plastics & Chemicals, Inc., 1212 Walck Rd., N. Tonawanda, N. Y.

DUREZ

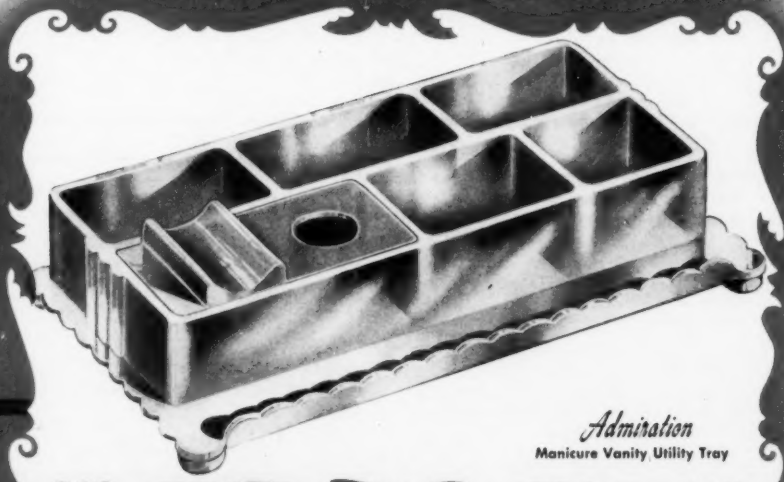
PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB

Catalin STYRENE

THE INJECTION MOLDER'S CHOICE FOR MASS-MARKET MERCHANDISE



Admiration
Manicure Vanity Utility Tray

Admiration
Pill and Carry-all Set
for Purse or Cosmetic Bag

When a product's *manufacturing* cost and its *selling price* must both justify a marketing incentive, the one all-qualifying material that delivers *most*—for *least*—is Catalin Styrene!

The products pictured here are quantity production items—mass-market promotions. Through the use of Catalin Styrene, they provided safe working margins between cost and price—thus enabling the marketers, Northeastern Plastics, Inc. of Boston to sell—successfully.

When planning your next product venture, we suggest you investigate the many economies and amazing properties embodied in Catalin Styrene. Inquiries invited!

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE, NEW YORK 16, N.Y.

MODERN PLASTICS*

VOLUME 27 DECEMBER 1949 NUMBER 4

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*Reg. U. S. Patent Office.

New kind of carpet

THAT WELCOMES THE CROWD!

. . . another triumph for Geon polyvinyl materials

WHERE many feet go back and forth across carpeting, the problem of wear and upkeep is costly. Now Geon, the amazingly versatile polyvinyl resin, makes possible a new kind of carpet that gives you everything you need in the way of comfort, good looks, plus extra wear and simplified cleaning.

This new-type floor covering consists of sheeting made from Geon and embossed like loop pile carpet, with a cushion of cellular sponge rubber for resilience. It is proving a boon in stores, doctors' offices, playrooms—wherever there is heavy traffic, yet high standards of decoration must be maintained.

Because it is made of Geon, it wears superbly, comes in a wide color range, including pastels. It resists oil, grease and fights abrasion. It can be washed, mopped or vacuumed quickly. It comes in rolls and can be installed as easily as any floor covering.

Here is another example of Geon's amazing range—it can be used to make delicate dolls' heads, fire-resistant upholstery, beautiful draperies, raincoats. There seems to be no end to the uses for Geon polyvinyl materials. Geon literally sparks new ideas—more saleable products.

We do not make any finished products from Geon polyvinyl materials but our technical service is always glad to work with you any time in helping you develop new uses or a new adaptation for Geon. For further information, please write Dept. N-12, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

17 parts . . . *all Chicago Molded Plastics*

It's radically different in appearance . . . more compact and easier to handle . . . with a shaving head twice the usual width. It's the new Sunbeam Model W Shavemaster, providing faster, smoother, more comfortable shaving than ever before.

Not only its striking beauty, but also much of its amazing efficiency is due to the use of Chicago Molded Plastics. A total of 17 molded plastics parts are used in 13 applications, requiring two different molding methods and four different plastic molding materials.

* * * *

In planning the new Sunbeam Shavemaster, experimentation showed that injection molded Forticel was best for the case and cord reel. Only injection molded nylon would meet the strict requirements of the fast moving connecting rod and the three piece connector assembly. The two motor end blocks called for plunger molded improved impact Bakelite while the motor housings and coil bobbins required flame resistant acetate.

Having available complete facilities for compression injection and plunger molding of all plastics materials, Chicago Molded engineers were not limited or biased in their recommendations. They were able to utilize the materials and methods best suited to the end result demanded of each of the 17 parts. At the same time, maximum production economies are assured.

That's what we mean by Chicago Molded complete service . . . engineering, mold-making, molding . . . the correct method and material . . . plus undivided responsibility for the entire job. It's the kind of service that has caused hundreds of industrial leaders to designate Chicago Molded as their primary source of supply for the best in molded plastics. And you'll find it a mighty good reason for discussing your next job with a Chicago Molded engineer. Just write or phone . . . there's no obligation.

CHICAGO MOLDED PRODUCTS CORPORATION

1046 N. Kolmar Ave., Chicago 51, Ill.

Representatives in principal industrial centers

COMPRESSION, INJECTION AND PLUNGER MOLDING OF ALL PLASTIC MATERIALS

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EDITORIAL

Evaluating Product Evaluation

Reports from store buyers, reflections of consumer opinion at retail level, comments on goods displayed at the housewares shows, hardware shows, toy shows, etc., and sales figures themselves, prove that most proprietary plastics products are today rated as high-grade merchandise in any price range.

A major factor in this increasing acceptance is an industrial phenomenon peculiar to the plastics industry: a group of product evaluation and design development programs instituted by individual material makers to improve the quality of plastic products.

The effectiveness of these programs has depended on three things: a) The establishment by the material maker of a committee of completely capable engineers, chemists, marketing men, and designers; b) The granting to such committee of full power of integrity and complete freedom from sales department pressure; c) The adherence to a basic philosophy that a plastics product must be a top-notch product regardless of its price.

All this is not as easy nor as inexpensive as it sounds. We have seen a material maker lose (temporarily) a whopping big molding account because the product evaluation committee rejected five products of that account in a row. We have seen a vinyl maker pull his labels out of a fabricator's plant when the fabricator was found to have degraded the product after receiving approval on a design. We have seen cases where molders have submitted products to the evaluation committees of two material makers and received critical rejection notices from both. This activity has demanded a lot of intestinal fortitude on the part of the material makers.

Here is the record of product evaluation by one material maker over the past year and a half: 1347 products were submitted; 800 of these received approval on first submittal; 547 were rejected, of which 122 were improved by molders and resubmitted; of this last figure 63 revised products have been approved, making a total of 863 products cleared under the program.

We have talked to many proprietary molders about this matter and have yet to find one who is unappreciative of the value of these operations. He gets advice on styling, strength and engineering factors, color, packaging and labeling, and even gets marketing suggestions. Whether he's buying 5 or 50,000 lb. of material per month has no effect on the advice he receives. The phenomenon couldn't work in any other way.

The fact that it has worked—and is still working—is borne out by the record and by the inevitable fact that more and more products submitted under the product evaluation programs can be OK'd on first submittal!

We are pleased in every respect with
Bakelite case molded for our 45 R.P.M.
record changer.
The Richardson people did a swell job
for us on this cabinet and, best of all, they
maintained their promises to a rush schedule.
Believe me, we are grateful.
From a letter of
Oak Mfg. Co. on cabinets
MOLDED by RICHARDSON
for their new 45 R.P.M.
automatic record changer

RICHARDSON MOLDING SERVICES

This sturdy record changer cabinet, molded by Richardson for Oak Mfg. Co., is only one of thousands of parts Richardson has molded efficiently, economically and on time for scores of manufacturers.

These cabinets come from the molds with a smooth, attractive finish that makes further finishing operations unnecessary.

Richardson experience in molding plastics produced this cabinet with tapped machine screw holes accurately spaced for quick, easy assembly. Also, Richardson experience pointed the way to produce the job at minimum cost.

Hundreds of manufacturers have found that Richardson's extra experience, extra facilities and extra know-how have paid important dividends. May we discuss with you your next plastic molding job?

INSUROK by RICHARDSON
Dependable names in plastics

The RICHARDSON COMPANY
GENERAL OFFICES: LOCKLAND, OHIO FOUNDED IN 1858
Sales Headquarters: MELROSE PARK, ILLINOIS

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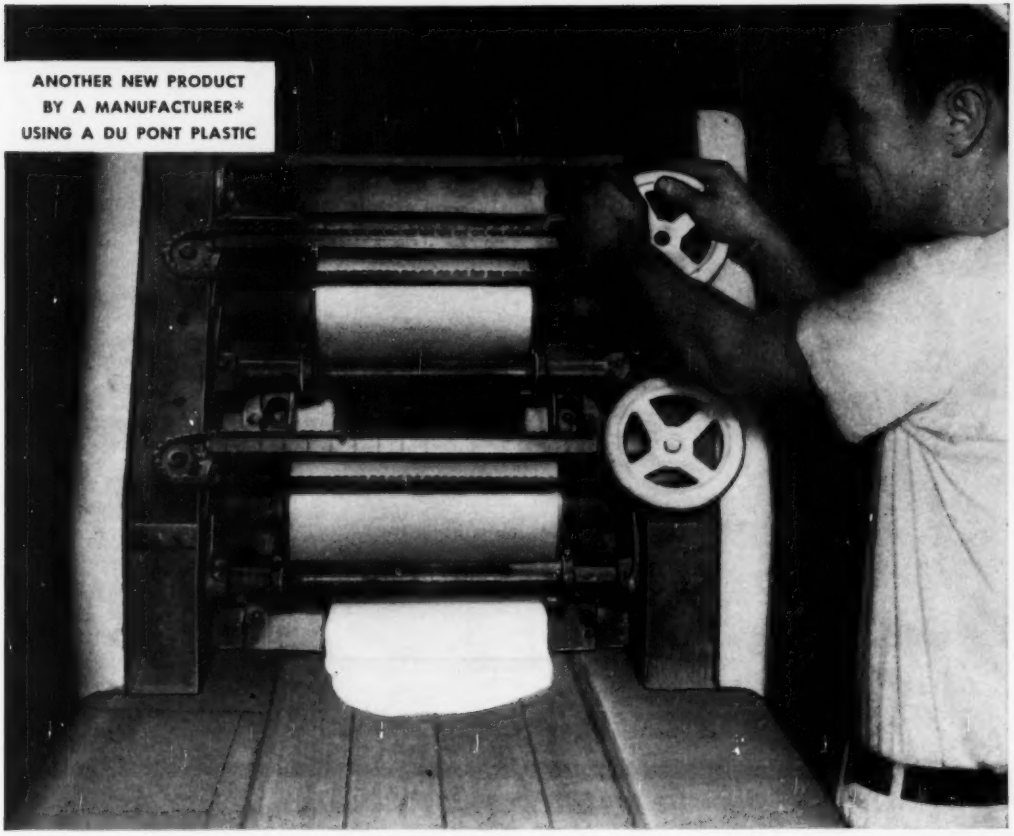


"TEFLON" ROLLS DOUGH WITHOUT STICKING— SAVES UP TO $20 A DAY PER MACHINE

WHAT'S NEW. The faces of this new home heat-sealer for frozen food packages are covered with a tough, thin film of highly heat-resistant Du Pont "Teflon." It makes home packaging easier because the "Teflon" cover prevents sticking of the faces on the sealer to plastic films used in home packaging of frozen foods. Made by The Dobeckmun Company, Cleveland, Ohio.

Nothing sticks to Du Pont "Teflon" tetrafluoroethylene resin . . . not even sticky dough. That's why bakers use bread sheeting rolls covered with a 1/8-inch layer of "Teflon." Unlike other types, these rolls don't pick up dough—need no flour dusting or scraping. Bakeries save as much as $20 a day on a single machine by the elimination of dusting flour alone.

In addition, rolls covered with "Teflon" yield a thinner sheet than old-style steel rolls, yet won't tear the dough . . . give a smooth, uniform product.

"Teflon" is used in many operations involving the handling of sticky materials. But this is just one of its many types of uses. It's flexible, durable—the most highly heat-resistant and chemically inert of all commercial thermoplastics. It's supplied as sheets, rods, tubes, tape, and molding powder. Write for more data on "Teflon" and other Du Pont plastics. E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept. (Consolidation of Plastics Dept. and Ammonia Dept.), Plastics Sales Offices: 350 Fifth Ave., New York 1, N. Y.; 7 S. Dearborn St., Chicago, Ill.; 845 E. 60th St., Los Angeles 1, Calif.

**Rolls covered with "Teflon" used on bread moulder-panner manufactured by Stickelber & Sons, Inc., 1150 Southwest Boulevard, Kansas City, Kansas.*

DU PONT
REG. U.S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

INTERNATIONAL PREFERENCE!

BUYING preference is influenced by supremacy the world over! That's why you'll find plastic molders in "far away places" following the lead of molders in this country in their choice of Reed-Prentice injection equipment. Over 430 of these popular machines have been shipped to foreign lands . . . and the list is still growing!

The 10E-16 Oz. model is shown above as displayed and demonstrated by Alfred Herbert, Ltd., at the Paris Industrial Show, Paris, France. Again, buying preference was created by such outstanding features as accurate time, temperature and pressure control; strong, practical construction; dependable operation and ease of maintenance.

For economical injection molding production, we urge you to investigate the complete line of models . . . 2, 4, 8, 10, 12, 16, 24, 32 and 60 Oz. capacities. Write Dept. D for the new Reed-Prentice circular "A Complete Service on Injection Molding".

NEW YORK 6 — 75 West Street • CLEVELAND 13 — 1213 W. 3rd Street • LOS ANGELES 11 — 2314 Santa Fe Ave.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

REED-PRENTICE CORP.
INJECTION MACHINES
WORCESTER MASS., U.S.A.

ALFRED HERBERT, Ltd.
Exclusive Agent in Great Britain, France, Italy and India

can tell you what's the SAFE plastic for toys

Every toy in the Plakie Line is a little masterpiece, and every one is made of Lumarith*—Celanese* *acetate* plastic.

Here's what tough Lumarith plastic gives to Plakie toys:

- **durability under hard play**
- **shatterproof safety**
- **no sharp broken edges**
- **clear through color**
- **satin-smooth surface**
- **less dust attraction**

These are the selling features every toy needs—and can have because Lumarith acetate plastic is priced right for even the lowest price toy today.

If you're manufacturing . . . if you're buying toys, insist on Lumarith. This tough Celanese acetate plastic cuts down breakage in shipment, counter damage, returns and dissatisfaction . . . is the most economical plastic in the long run.

Celanese Corporation of America, Plastics Division, Dept. 1-L 180 Madison Avenue, New York 16, N.Y.

LUMARITH* (ACETATE)

Celanese* PLASTICS

*Reg. U. S. Pat. Off.

NOTICE

¡Aviso!

anuncio

30,000 DORNBUSCH GRAINS

now available throughout the western hemisphere by

F. A. RINGLER CO.

42 PARK PLACE, NEW YORK 7 • BArclay 7-4070

CREATORS OF FINE GRAINING PLATES

Veteran distributors are predict

WORLD'S LARGEST COLLECTION OF GRAINS

Internationally famous Patterns and Grains available from Ringler

The renowned Dornbusch graining plates, preserved during the war in a bomb-proof vault, have been rediscovered and made available throughout the Western Hemisphere by F. A. Ringler Co. of New York.

This huge library of Dornbusch grains for plate or roller embossing now supplements the catalog of Ringler high-styled designs — providing the Plastics Industry with the most extensive group of surface textures ever assembled.

All of the 30,000 Dornbusch patterns for plates will be obtainable either as steel or electrosteel plates.

It was also announced that the Dornbusch Embossing Machines would soon be available here.

The Package is Part of the Product . . .

CORTLAND LINE COMPANY Packs Its Bait Casting Line in a Handsome Permanent Container . . .

custom molded by ERIE RESISTOR

The transparent polystyrene case which holds two 50 yard reels of Cortland "Dri-Seald" Bait Casting Line makes a perfect display, and adds to sales appeal because it serves as an ideal container for the line, or for other tackle of the fisherman's art.

Erie Resistor solved the production problem by combining practical mold design with timing and temperature control, to avoid corner cracks and scoring, and accomplish an economical output of perfect pieces.

As the pioneer in custom injection molding, Erie Resistor has had long experience in solving the problems that require an intimate knowledge of materials and their behavior, and a practical know-how of molding techniques. It will pay you to bring your plastic problems to Erie Resistor.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND • • TORONTO, CANADA

Let's not be misled

TUPPER!

Originators and largest manufacturers of flexible table and housewares Poly-T (trade mark) Tupperware

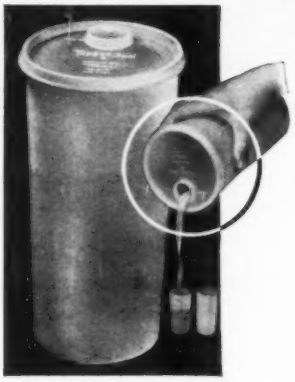
. . . and, incidentally the only such products to be known, by name, to the Colonel's Ladies and the Judy O'Gradys' of the North American Continent; the British Isles; Continental Europe and the far corners of the world . . . some of it is on its way with the Hassoldt Davis Expedition into Africa, French Mauretania and the Ivory Coast.

To assume that the "blood, sweat and tears" by which that place in the sun known as leadership was attained without some thought of preservation of standards and principles, would be a very broad and naive assumption indeed.

At the moment, this is accomplished through the monopoly which this organization has created for Tupperware, Poly-T (trade mark) products. For, there is only one Tupper Poly-T and only one Tupperware. Tupper products, designed, developed and made by this organization are identified as such by being plainly marked on the bottom of each piece.

This identification means too, that no Tupper product; no application of Tupper Poly-T (trade mark) has ever been, or ever will be made available for any purpose or use until all the circumstances and conditions to which such product or application may be subjected, have been thoroughly explored.

So let's not be misled as products fashioned of polyethylene are under consideration. Instead, make certain that those originators and largest manufacturers of flexible table and housewares are included in those considerations.



TUPPER

The Tupperware 50 oz. Canister, 4¼" diameter with Tupper Seal, flexible, air and liquid-tight Pour All cover is an outstanding example of that principle mentioned above . . . "no Tupper product . . . has ever been made available . . . until all the circumstances and conditions to which such a product . . . may be subjected, have been thoroughly explored."

This most recent addition to the famous family of Tupper Canisters was conceived, designed and made only after following this procedure.

For the purpose of serving as the decanter for the contents of a No. 5—46 oz. juice can, this Tupperware piece has found extraordinary favor.

In the matter of use as a storage container into which prepared liquid refreshments may be placed until decanted it has no equal.

For the keeping of celery in the stalk, carrots and many other vegetables fresh and crisp, enthusiastic comments have been many.

The purchase and use of one has almost invariably been followed by the buying of one or two more. They fit so nicely in the refrigerator and do so many things so well, they have, in the relatively short time in which they have been available, become a tremendous item in production.

8½" tall, 4¼" diameter at the top, tapering gracefully and gently to 3½" diameter at the bottom and made in snowy white, Tupper Poly-T (trade mark) "material of the future".

TUPPER CORPORATION

Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

FACTORIES: Farnumsville, Mass., and Cuero, Texas — New York Show Rooms 225 Fifth Ave.

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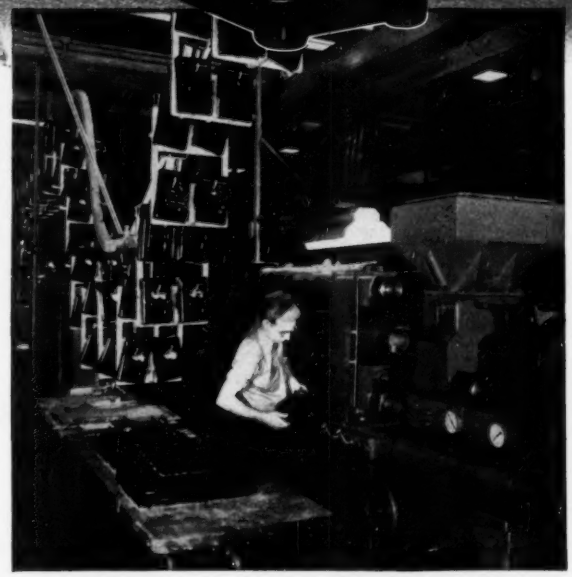
17 H-P-M's ...feed Western Electric's assembly line



TWO HAVE BEEN ON THE JOB FOR MORE THAN 10 YEARS

It takes a lot of equipment to satisfy the world's appetite for telephones. Seventeen H-P-M injection molding machines feed plastic parts to the conveyors which carry them in a never-ending stream to the assembly lines.

Two of these H-P-M machines have been on this job over ten years. Their number has grown to seventeen . . . evidence of their dependability and the high esteem in which they're held.

Whatever *your* molding job

There's an H-P-M machine to handle your work . . . injection, compression or transfer molding . . . small job or large.

Call in a nearby H-P-M Engineer today! Write for bulletins.

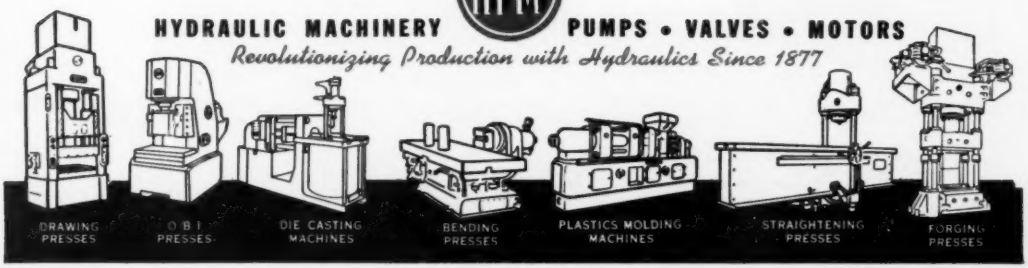
THE HYDRAULIC PRESS MFG. CO.
1010 Marion Road, Mount Gilead, Ohio, U. S. A.

H-P-M 16 oz. Injection Machines molding Western Electric telephone bases.

HPM

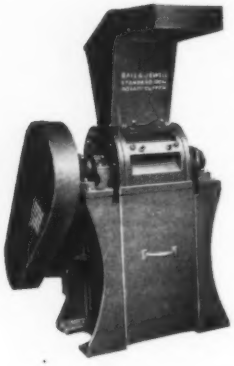
HYDRAULIC MACHINERY **PUMPS • VALVES • MOTORS**

Revolutionizing Production with Hydraulics Since 1877



what do you ask yourself about STANDARD EQUIPMENT

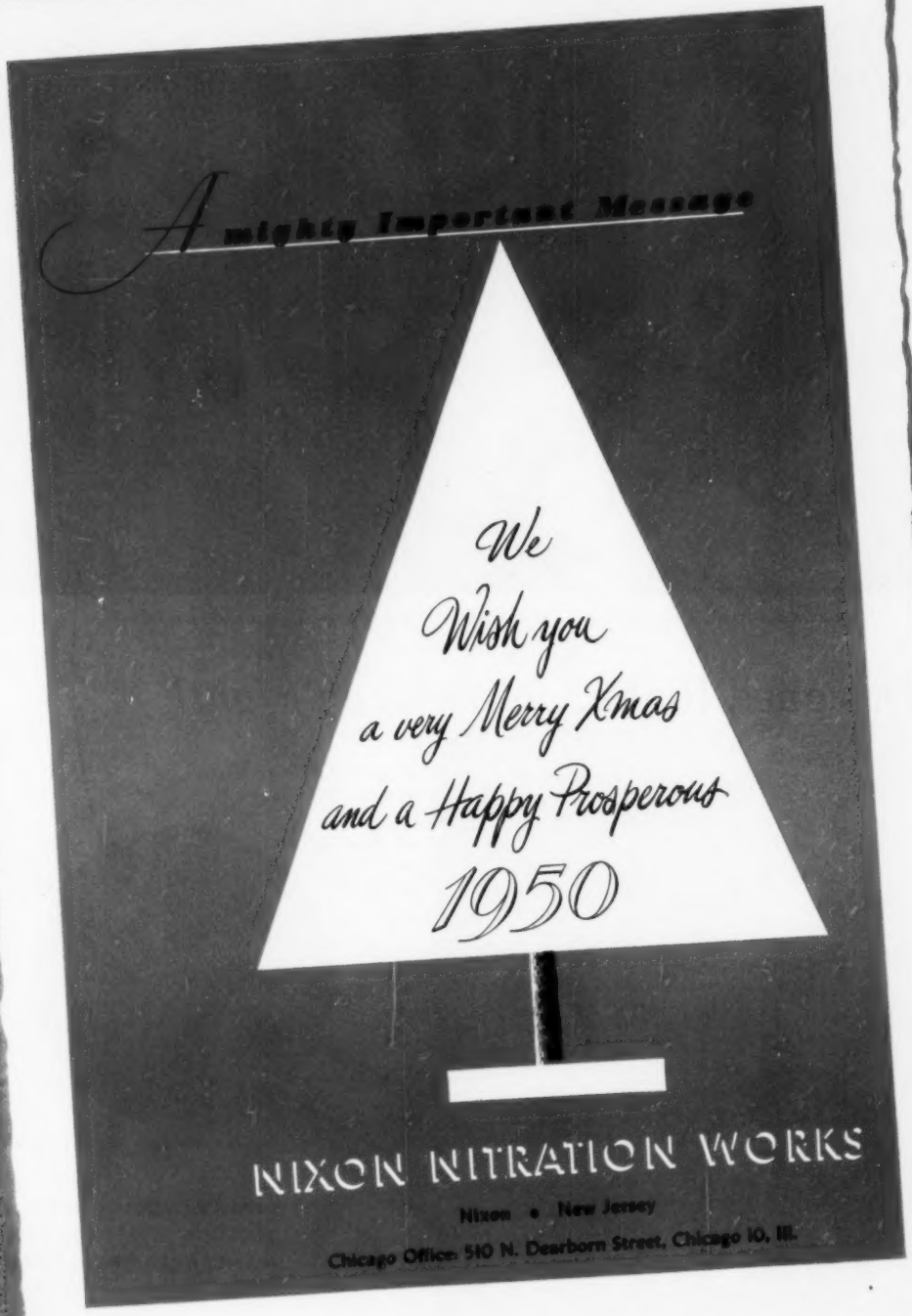
Will it handle the average production job efficiently and economically? Is it easy to install? Is it easy to operate? Is it simply constructed? Is it easy to service? Is it easy to get replacement parts direct from the manufacturer? Will the manufacturer engineer changes or design special equipment on the machine to meet my specific requirements? Will the manufacturer exchange equipment to meet any changing production requirements, based on an equitable trade-in?



The B & J standard ideal Rotary Cutter has been standard equipment in the plastics industry for years. It assures a "yes" answer to every question that might come to your mind! This machine contains every B & J improvement made during the past 45 years. It is ideally suited for the reduction of all types of plastic compounds up to ½" sectional thickness into uniform granules, at the rate of up to 250 pounds hourly. Send for catalog.

BALL & JEWELL, INC.

22-28 FRANKLIN ST., BROOKLYN, N. Y.

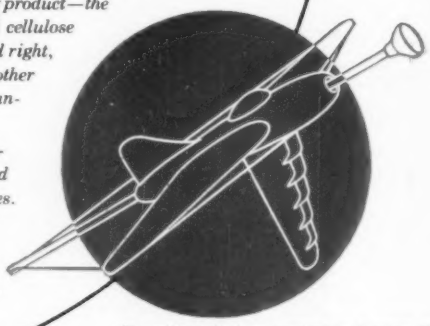

A mighty Important Message
We
Wish you
a very Merry Xmas
and a Happy Prosperous
1950
NIXON NITRATION WORKS
Nixon • New Jersey
Chicago Office: 510 N. Dearborn Street, Chicago 10, Ill.

K-Jet, Kenton Plastics' version of the original sketch—an up-to-the-minute toy designed to appeal to modern youngsters

Designed Right . . . *it Sells on Sight!*

It started with a Hercules design sketch for a new and different toy. Collaboration of designer and manufacturer translated the original idea intact into an attractive, sales-compelling product—the K-Jet shooting toy, molded with tough, colorful cellulose acetate by Kenton Plastics Corporation. Designed right, with the proper plastic, it sells on sight . . . another example of the advantages of sound product planning with the versatile cellulosics.

You, too, will find that designing with the cellulosics can lead to broadened markets and increased sales. Our technical staff invites your inquiries.



The original sketch as conceived by Sundberg-Ferar

BEAUTY COLOR STYLING
TOUGHNESS LIGHTWEIGHT
MANUFACTURING ECONOMY

HERCULES POWDER COMPANY 916 Market Street, Wilmington 99, Delaware CP9-6

This extremely heavy, heat-resistant handle is used on the Wagner Mfg. Company's Magnalite cookwear line and withstands oven temperatures reaching 500°.

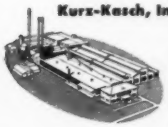
HANDLES WITH CARE!

The teakettle handle for the Aluminum Cooking Utensil Co. of New Kensington is furnished completely assembled—with right and left halves, red thumb pad, moulded-in inserts consisting of speed clips, aluminum stamped links and spring.

The sales appeal of this VitaCraft stamped aluminum 2-quart pan is enhanced by the typical characteristics of this phenolic handle—by smooth pleasant feel, non-conduction of heat and gleaming appearance.

Let us give you a hand with your handles—good, durable custom-moulded pot and pan handles are a Kurz-Kasch specialty, as these three different specimens attest. All three do their share in winning the markets that these quality products enjoy. They're as acceptable cost-wise as they are performance-wise—they're phenolic, plunger-moulded in high-capacity 8 & 10-cavity presses.

We also produce a fine line of stock handles and knobs. For full information on plastics—for any product that can be plunger, transfer or compression moulded—consult your local Kurz-Kasch office or write the factory. We offer complete facilities and a pioneer achievement record second to none.



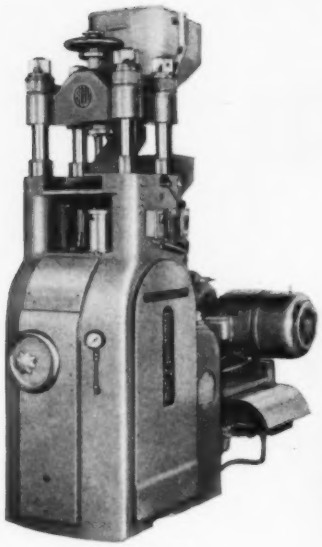
Kurz-Kasch, Inc. • 1415 South Broadway • Dayton 1, Ohio

BRANCH SALES OFFICES: New York, *Lexington* 2-6677 Chicago, *Harrison* 5473 • Detroit, *Woodward* 2-5214 Philadelphia, *Granite* 2-7484 • Dallas, *Lakeside* 1022 Los Angeles, *Prospect* 7503 • St. Louis, *Rosedale* 3542 Toronto, Canada, *Adelaide* 1377.

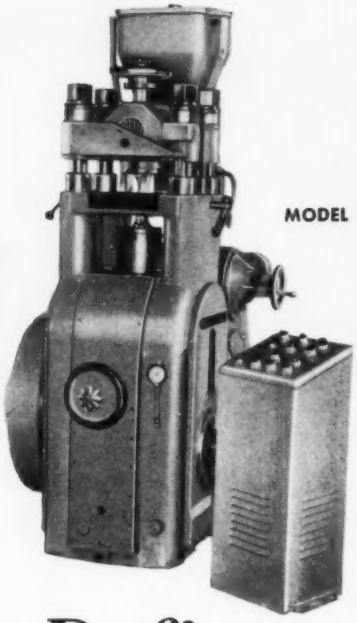
EXPORT OFFICE: 89 Broad Street, New York City, Bowling Green 9-7751.

Kurz-Kasch

FOR OVER 33 YEARS PLANNERS AND MOULDERS IN PLASTICS



MODEL 20



MODEL 30

Announcing Baldwin-Defiance preform presses

FOR COMPLETE SERVICE TO THE PLASTICS INDUSTRY—

The Baldwin Locomotive Works has purchased the Defiance line of preform presses. All models of Defiance preform presses will now be manufactured under the Baldwin-Defiance name.

An exclusive feature of the Baldwin-Defiance press is a method of rapid and accurate adjustment which allows changes of density and weight while the machine is running. The ejection system, also exclusive, provides for cam ejection of preforms without lost motion. All models have automatic lubrication, cam controlled feeder and variable speed drive, adjustable from 30 to 60 strokes per minute.

MODEL 45

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Boston, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd., Toronto, Ontario

BALDWIN

PLASTICS PRESSES

Cookie Cutters, Molded for the Chickadees, Tulsa, Oklahoma

Skillful Molding CUTS A CUTE COOKIE

These cookie cutters which we molded for the Chickadees, Tulsa, Oklahoma, are a real double feature. First they're attractive cookie cutters. Hang them on a Christmas tree and they're colorful ornaments.

To gain this double appeal, the product had to be made of a plastic material. We chose a material that would be kitchen practical as well as Christmas tree glamorous. Sound engineering plus exacting molding craftsmanship did the rest.

We will handle your plastic problems with the same careful consideration of your product's requirements. So whenever plastics are called for—make our new, modern plant your first step to a better plastic product.

NEW PLANT

NEW ADDRESS

Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about [redacted], piping, tubing and fittings, write for circulars containing data and illustrations.*

*Trademark Registered

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Lucite, Nylon, Ethyl Cellulose, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, [redacted]*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

"Selling Vision"

CREATED THIS

ADMIRAL TELEVISION SET

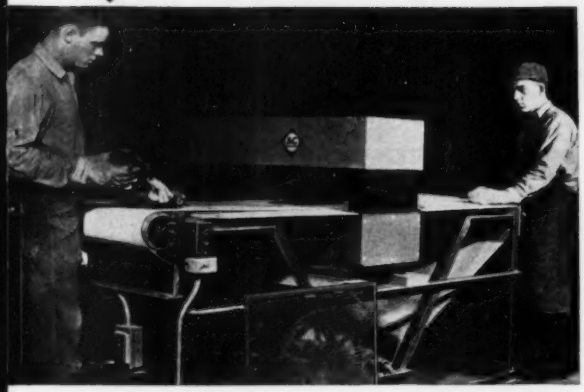
WITH MPc MOLDED CABINET

The television-hungry public saw in this set exactly what they wanted…top notch performance, handsome good looks, down-to-earth cost. And they're saying it with orders! "Selling vision"…a sound appraisal of the public's preference …put this television set in its sleek, colorful, sturdy plastic cabinet. Plastics gives this set eye-captivating beauty…and at the same time reduces cost in several ways. Molded-in openings for picture tube and controls make for fast, low-cost assembly. Ingeniously engineered side cores provide the speaker grill and ventilating holes. And of course, the mold-perfect lustre eliminates all finishing. Tooling and producing this large casting, with its 18½ inch deep draw, calls for the experience and special skills in which **MPc** excels. In like manner, **MPc** can make plastics perform to *your* commercial advantage. Submit your plastics product or problem to MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Ill.

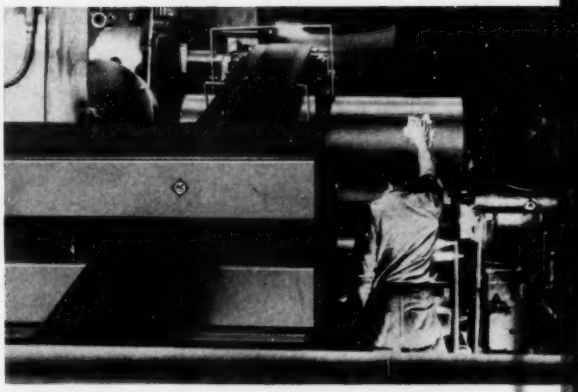
Cabinet dimensions:
14½ x 15 x 18½ inches
Weight 16½ lbs.

PLASTICS DIVISION
MOLDED MPc PRODUCTS
CORPORATION

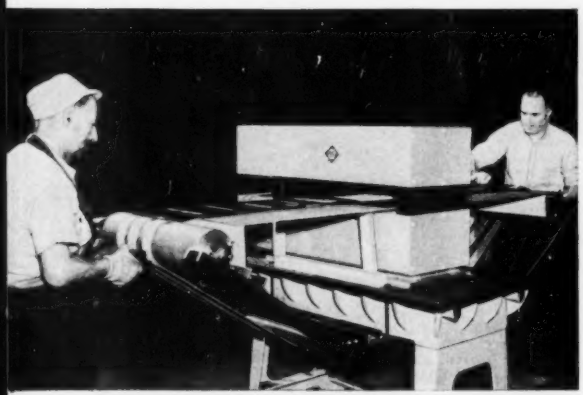
Four Cases from Diary of Metal Detector Engineer



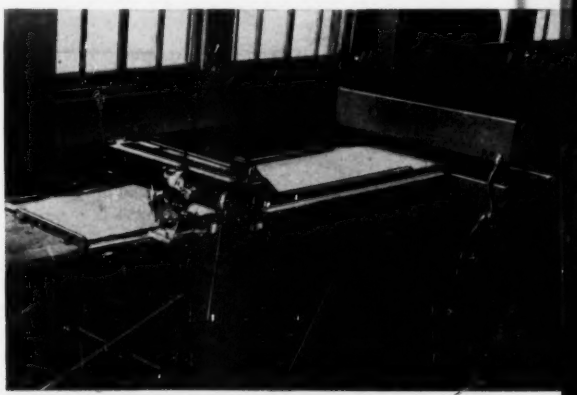
$8,000 LOSS — Saw some damaged calender rolls in a plastics plant. One had to be scrapped . . . the others could be ground down. All caused by a workman's screwdriver. Using this detector, loss would have been avoided, unit would have paid for itself several times over.



$2,000 SAVED — A real thrill today! Started up the new Metal Detector for the customer and 30 minutes later it spotted a piece of tramp metal. The conveyor was stopped instantly. Customer figures the unit paid for itself by saving a calender regrinding operation estimated at $2,000.



SAVED $1,274 IN 21 DAYS — Phonograph record maker showed me their reports for first 21 days operation of their Electronic Metal Detector. They're detecting metal in plastic biscuits before they reach matrices. Inspected 124,994 biscuits. Found 182 containing metal. Saved 182 matrices at $7 each.



STOPPED CUTTER BREAKAGE — Checked installation of plastic tray maker. He reports damage to cutters eliminated. Occasionally one of the thousands of needles used in the felting process breaks. Now, if a needle breaks in the plastic, the conveyor is stopped — and the contaminated area is removed.

SPOT MAGNETIC OR NON-MAGNETIC METAL PARTICLES — Pieces as small as .039 of an inch in diameter are located by the Allis-Chalmers Electronic Metal Detector regardless of how deeply embedded. Systems may be arranged so that when metal is detected: 1. conveyor is stopped, 2. automatic rejection device is actuated, or 3. an alarm signals for manual removal of contaminated article. Handles belts to 24" wide at speeds from 15 to 600 fpm. Aperture heights: 2", 4", 7" and 12".

ALLIS-CHALMERS

ALLIS-CHALMERS, 1163A SO. 70 ST. MILWAUKEE, WIS. A-2823

Please send more information about Metal Detectors.

Name.....

Title.....

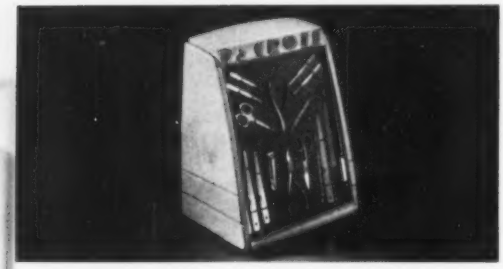
Company.....

Address.....

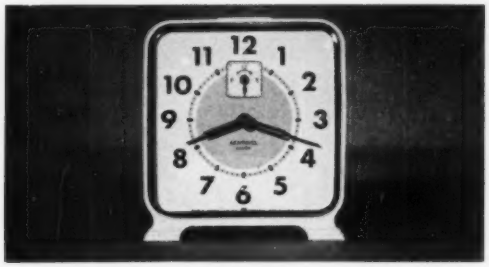
City.....State.....

"designed right . . . in the right plastic"

custom molders' know-how plus STYRON

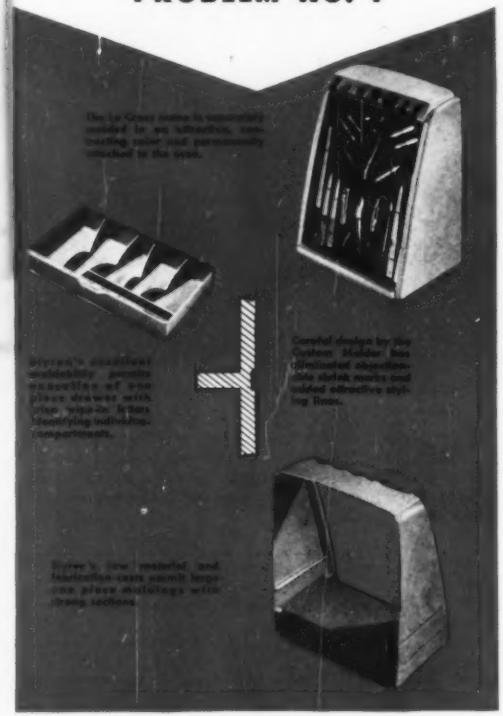


La Crosse Counter Display Cabinet molded by Mack Molding Company, Arlington, Vermont, for La Crosse, Newark 3, N. J.

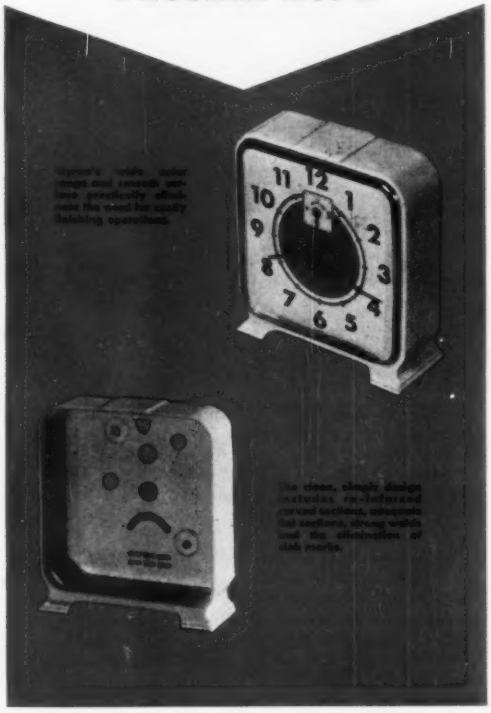


Sentinel Comet Clock molded by Watertown Manufacturing Company, Watertown, Connecticut, for the E. Ingraham Company, Bristol, Conn.

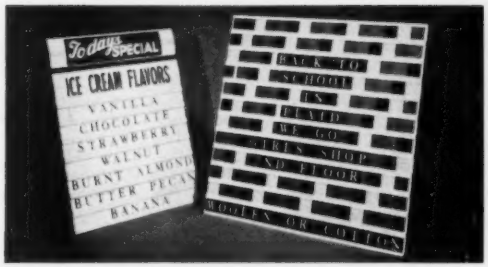
CUSTOM MOLDING PROBLEM NO. 1



CUSTOM MOLDING PROBLEM NO. 2

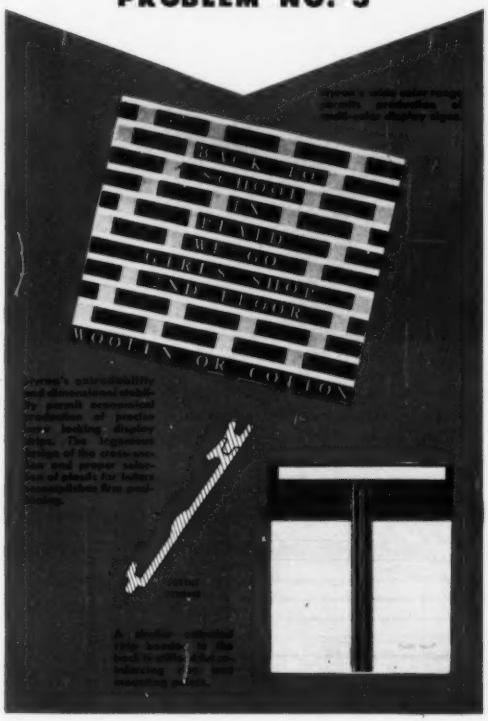


solves **three difficult production problems!**



Display signs extruded by General Electric Company, Pittsfield, Massachusetts, for Dojama Eastern Corporation, Gordonsville, Virginia.

CUSTOM MOLDING PROBLEM NO. 3



Your fabrication problems can be solved quickly and economically by a qualified Custom Molder. His designing know-how plus his judicious selection of the right plastic from a wide range of Styron thermoplastics will give you more pieces per dollar spent.

The Custom Molder maintains extensive design and engineering facilities to serve you. Competent technicians, well versed in the problems of plastics and fabrication methods, are your assurance that your product will be "designed right . . . in the right plastic."

Dow research and the Custom Molders' skill help you utilize to full advantage the excellent properties of Dow Plastics in your products. Write Dow today and let us put you in touch with a qualified Custom Molder, who can solve your problem.

Plastics Division, Dept. SJP
THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington
Chicago • Detroit • Cleveland • St. Louis • Houston
San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

DOW
plastics

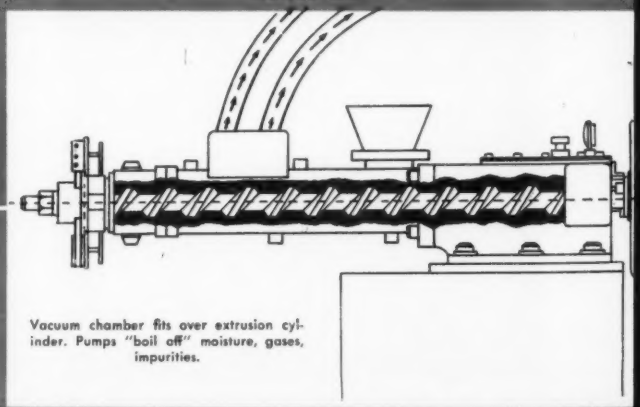
new compounder extractor extruder*

eliminates

Revolutionary unit lowers cost by "boiling off" moisture, air, volatile impurities

Here's the first word about this astounding new machine that not only does all the jobs performed by the reknowned Compounder-Extruder (coloring, compounding and pelletizing), but also takes over the jobs currently done by expensive drying ovens and pre-heating devices! Specifically, it compounds, extrudes and pelletizes in one continuous operation, and at the same time, *with no decrease in production speed*, removes excess moisture from the compounds being processed.

With a Compounder-*Extractor*-Extruder installed in your plant, you will be able to produce extrusions or molding pellets *without* pre-drying the resins. Even thermoplastics which are extremely hygroscopic can be processed on highly humid days and they will still yield commercially satisfactory uniform pellets or finished extrusions which show no trace of porosity.



Vacuum chamber fits over extrusion cylinder. Pumps "boil off" moisture, gases, impurities.

resin pre-drying

HERE'S HOW IT WORKS

This new Welding Engineers development incorporates the same advanced design features of the Compounder-Extruder: Dual worms of exclusive, patented design, operating in a special "pressurized" compounding cylinder, knead and work the resins, plasticizers, colorants, fillers and stabilizers. In addition, the Compounder-*Extractor*-Extruder includes a special *vacuum chamber* which is located over the dual worms approximately midway between the feed hopper and the die.

As the hot compounded mixture passes through this vacuum chamber, moisture, trapped air and volatile impurities (oils, monomers, catalysts and the like) "boil up" and are carried off by exhaust lines provided for the purpose. This moisture withdrawal operation is so effective that it has actually reduced the moisture content of certain synthetics from 50% at the feed hopper to .5% at the takeoff. Moreover, since the vacuum chamber is an integral part of the extruding machine, no slow-down of the worm speed with consequent lowering of output is required.

REDUCES COSTS ALL ALONG THE LINE

Whether your business is molding or extruding or both, the Compounder-*Extractor*-Extruder will drastically lower many of your operating costs. . . . You'll be freed of burdensome inventories of pre-mixed compounds. Just as important, you'll be freed of the bugaboo of erratic deliveries of special formulations and resultant disrupted plant scheduling.

Actually, you'll stock only pure pigments or dyes, and resins and plasticizers; then compound, extrude or pelletize them into special formulations from day to day as they are needed.

And the Compounder-*Extractor*-Extruder solves your scrap reclamation problem as well. Just reprocess your scrap "straight" or re-mixed with virgin resins—and it's ready for use again.

A SIZE FOR EVERY JOB

There are five models of the Compounder-Extractor-Extruder. Their outputs range upward from an average of 110 per hour for the smallest model to several thousand pounds per hour in the largest.

THESE FEATURES ARE COMMON TO ALL MODELS
5-zone heating jackets
Maximum temperature—500°F
Torquontrol—continuous indication of mechanical torque with automatic overload cut-out
Replaceable barrel liners
Interchangeable heads and extrusion dies

COMPOUNDER-EXTRACTOR EXTRUDER MODEL	NORMAL H.P.
Series 2000	7½
Series 2800	15
Series 3500	30
Series 4500	60
Series 6000	125

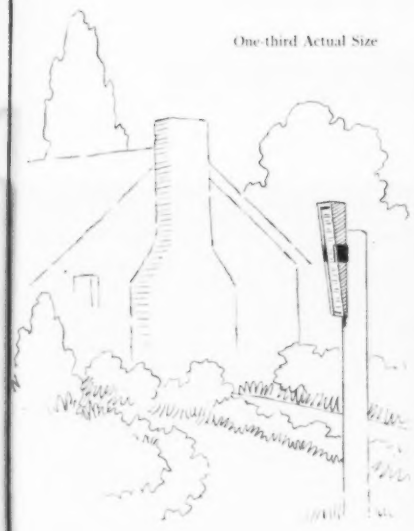
*Patents issued and pending

INQUIRE

Ask for detailed specifications and prices today. Please specify materials to be processed and output required.

machinery division
WELDING ENGINEERS, INC.
NORRISTOWN, PENNSYLVANIA

Everyone talks about the Weather
BUT
We've **DONE** *something about it!*



One-third Actual Size

Molded for
Jobs Inc.
Albert Lea, Minn.

Everyone who grows anything is interested in the amount of rainfall. This information, previously obtainable only from government weather stations, is now available on the spot with the new "Tru Chek" rain gauge.

It is of special value to farmers, gardeners, both amateur and professional, radio stations, factories and all places where rainfall is interesting or important.

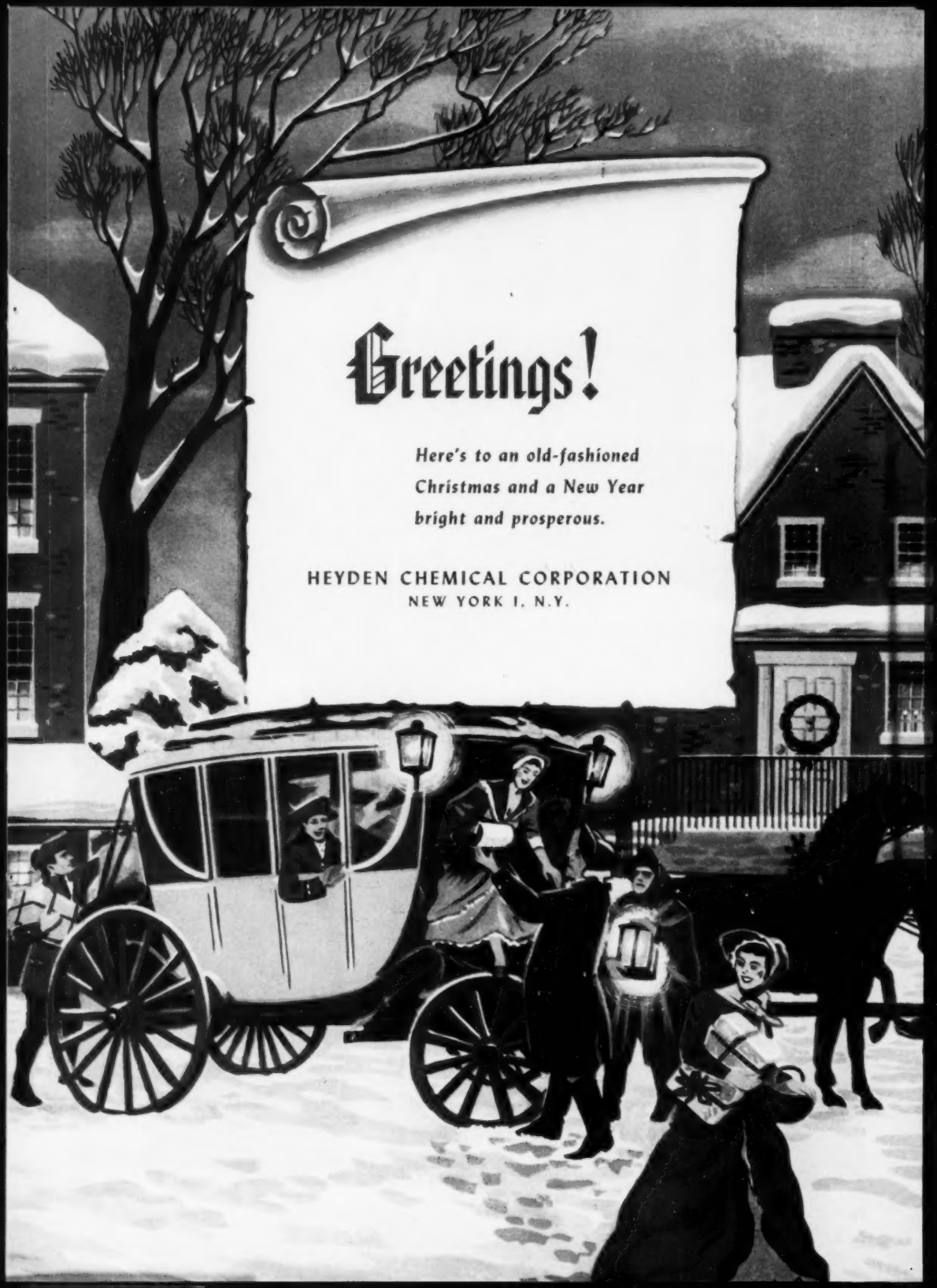
Molded from weather-resistant plastic, this rain gauge is another forward step in the use of plastics.

Let us help you work out your plastic problem to a successful conclusion.

INJECTION MOLDING
MINCOR
YOUR PLASTICS DEPARTMENT

MINNESOTA PLASTICS CORP.

366 WACOUTA • ST. PAUL 1, MINN.


Greetings!
Here's to an old-fashioned
Christmas and a New Year
bright and prosperous.
HEYDEN CHEMICAL CORPORATION
NEW YORK 1, N.Y.

STURTEVANT DUSTLESS BLENDERS

Thoroughly Blend Substances into an Inseparable Mass

The 4-Way Mixing Action of the Sturtevant Dustless Blenders thoroughly mixes two or more substances into an inseparable whole . . . every part of which is the same analysis. Single receiving and discharging opening insures tight sealing during mixing process. "Open-door" accessibility permits thorough cleaning. The fast, accurate mixing operation increases output . . . cuts mixing costs. Available in many sizes with mixing capacities from $\frac{1}{4}$ ton to 75 tons per hour. Write for information and catalog.

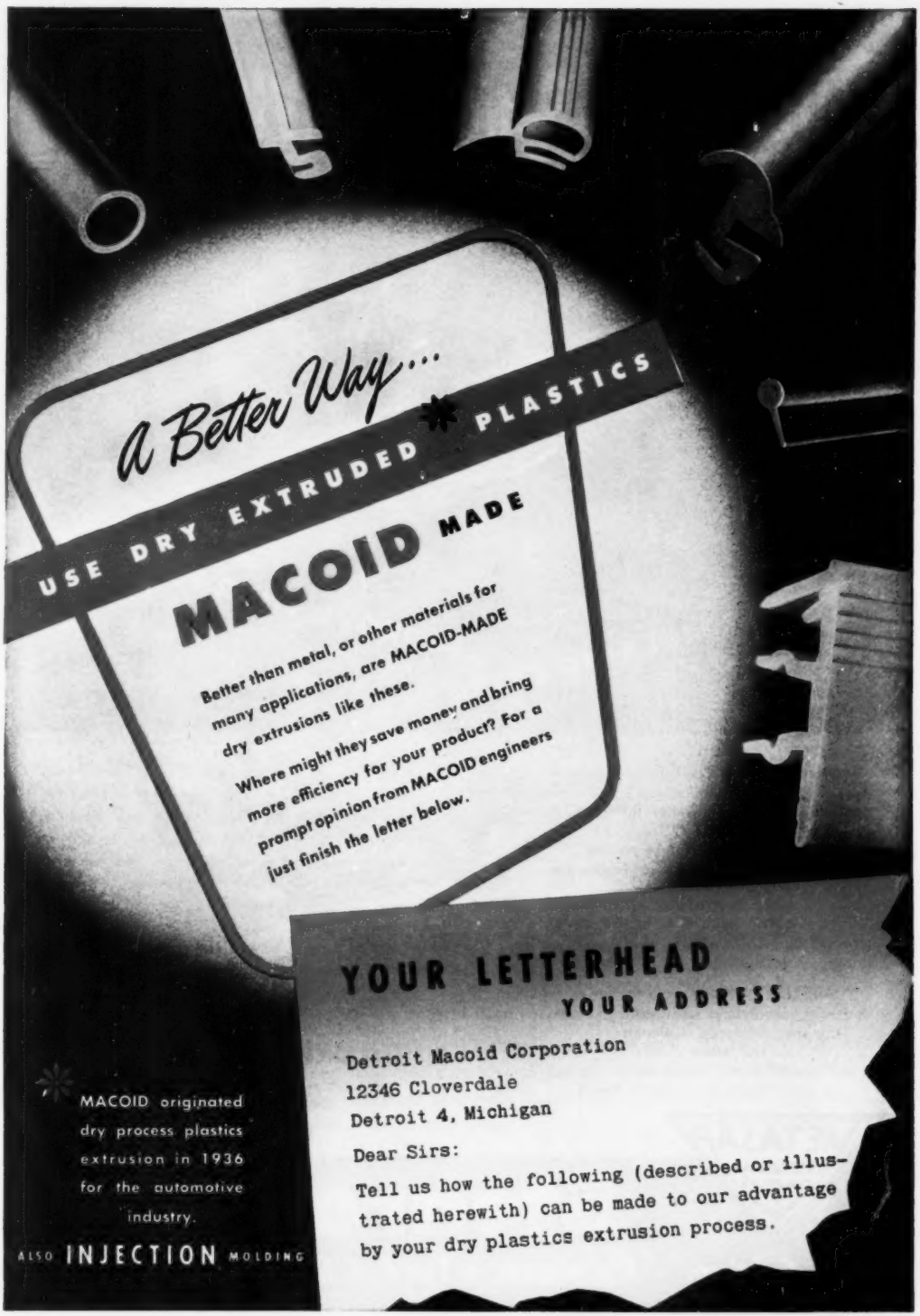
Receiving — The ingredients to be mixed enter the mixing chamber of drums through a chute. Note scoops which carry up and dump the ingredients as drum rotates assuring a more uniform mix.

Discharging — Throwing a lever closes the inlet and mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

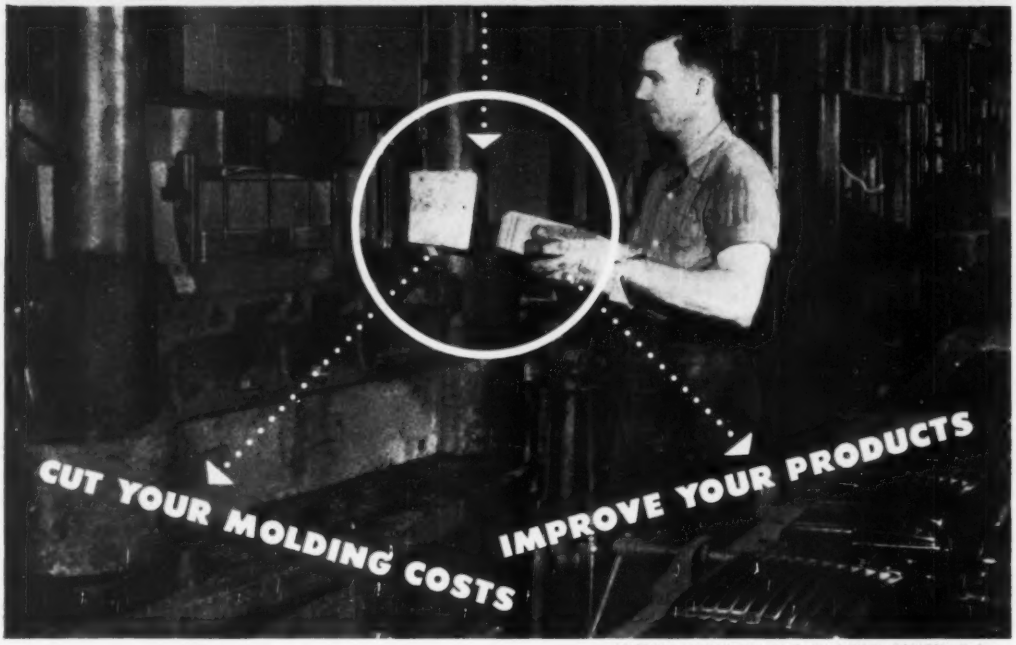
The Sturtevant Mill Company

110-A Clayton Street, Boston 22, Massachusetts

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS


A Better Way...
USE DRY EXTRUDED * PLASTICS
MACOID MADE
Better than metal, or other materials for many applications, are MACOID-MADE dry extrusions like these.
Where might they save money and bring more efficiency for your product? For a prompt opinion from MACOID engineers just finish the letter below.
YOUR LETTERHEAD
YOUR ADDRESS
Detroit Macoid Corporation
12346 Cloverdale
Detroit 4, Michigan
Dear Sirs:
Tell us how the following (described or illustrated herewith) can be made to our advantage by your dry plastics extrusion process.
* MACOID originated dry process plastics extrusion in 1936 for the automotive industry.
ALSO INJECTION MOLDING

LUBRICANTS and SERVICE that



COURTESY OF BOONTON MOLDING COMPANY, BOONTON, N. J.

Metasap Zinc, Calcium and Barium Stearates speed molding operations, prevent waste. Under heat and pressure, they flow to the surface of the compound and assure

- ... *no sticking during rolling*
- ... *elimination of shutdowns for scraping mills*
- ... *easy flow of the plastics mix*
- ... *quick release from the mold*

(Or, if you wish, you can use these stearates for dusting your molds.)

RESULT: Greater volume, fewer rejects . . . costs cut, profit up. And better products to boot! . . . for these Metasap lubricants

- ... *do not stain molds*
- ... *eliminate blooming*
- ... *promote a superior finish*

And Metasap Stearates are backed by Metasap Technical Service. Our "saturation" coverage of the entire country with an exceptionally well-informed, alert force of representatives assures fast, competent service to each and every customer. *You get what you want when you want it.* And technical problems are referred back immediately to our central laboratory, which gladly provides information resulting from accurate tests, makes recommendations based upon your specific requirements.

For complete information, write

METASAP CHEMICAL COMPANY, Harrison, N. J.

CHICAGO • BOSTON • RICHMOND, CALIF.

CEDARTOWN, GA.

METASAP CHEMICAL COMPANY REG. U.S. PAT. OFF.

Stearates

of Calcium • Aluminum • Lead • Magnesium • Zinc

ENGINEERED TO YOUR NEEDS

We extrude whatever you want — whether it's for medical use, chemicals, electrical applications, garden hose or other purpose. Materials include Polyethylene, Nylon and all formulations of Vinyl in standard or special gauges up to 2" O. D. Yardley "Tru-Size" standard of quality insures better finish, greater uniformity, more accurate dimensions.

There's an experienced Yardley representative near you.

YARDLEY PLASTICS CO.

142 PARSONS AVE. • ADams 9315 • COLUMBUS 15, OHIO

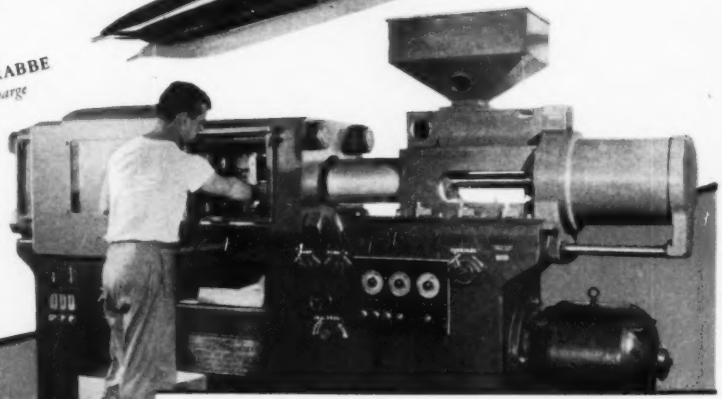
No Nicer Words...

THE PARKER PEN COMPANY

JANESVILLE, WISCONSIN, U. S. A.

"Four of our six injection molding presses are No. 5 C-8 Fellows Leominster Machines. Although we operate them 24 hours daily they have been exceptionally trouble-free. We find them easy to set up and to operate. We are particularly pleased with the excellent service rendered by the company in installing and servicing their equipment."

So says
MR. WILLIS RABBE
Vice President in charge of Manufacturing.



Parker "21" molded parts just as they look when broken from a gate after molding.

And well deserved...for the popular Parker "21" is built around the perfection inherent in these thin-wall molded parts. Perfect threads, too, are molded in, using threaded core pins...F-L "Speed Flo" machines provide stepped-up time cycling—a speeding up that pays off in molding profits. Every man in the market for equipment owes himself a close look at F-L "Speed Flo" features.

Fellows LEOMINSTER
injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Division. Head Office and Export Department, Springfield, Vermont. Branch Offices: 616 Fisher Building, Detroit 2; 640 West Town Office Building, Chicago 12; 7706 Empire State Building, New York 1. New England Distributor, Leominster Tool Co., Leominster, Mass.

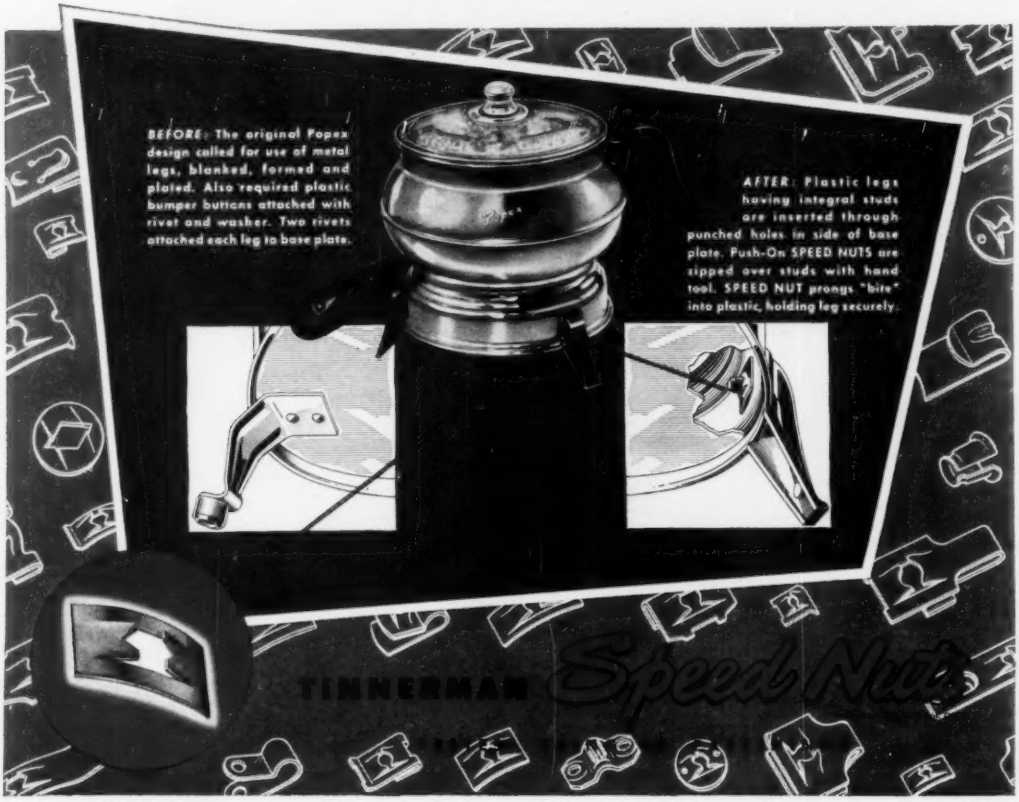
"Popcorn and Push-Ons"

...a story of product redesign using 4 Push-On Type SPEED NUTS to eliminate 14 operations...cut material costs 30%!

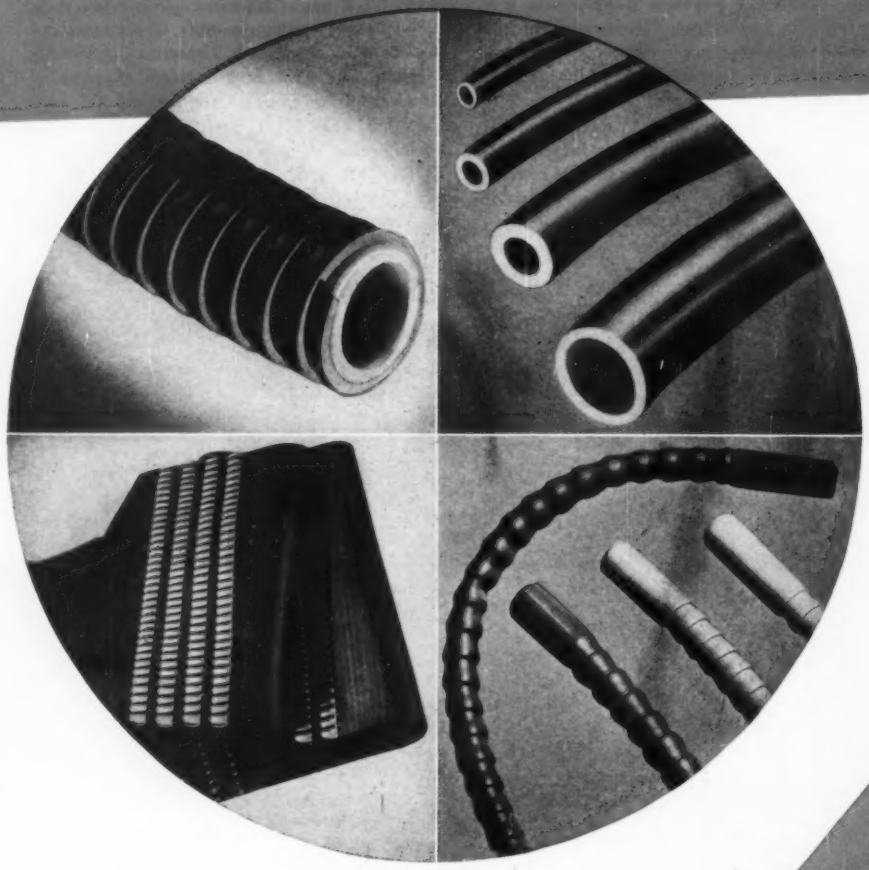
How to keep the "lid" on the retail price of their new, distinctive popcorn popper was a problem faced by Popex, Inc., Cincinnati, Ohio.

This meant watching production costs carefully. For instance, the cost of attaching the metal legs to the base seemed out of line. Alternate methods were considered, and Push-On Type SPEED NUTS combined with plastic legs provided the best, fastest and most economical solution. This combination eliminated 14 assembly operations and reduced material costs 30%!

From popcorn poppers to passenger cars, SPEED NUT brand fasteners are proving their value—in faster, easier assembly, lower costs and better product design. A Tinnerman Fastening Expert can show you how to gain these benefits. Contact him by phone. Also, write for your copy of SPEED NUT Savings Stories—actual case histories of cost savings. TINNERMAN PRODUCTS, INC., 2040 Fulton Road, Cleveland 13, Ohio. In Canada: Dominion Fasteners, Ltd., Hamilton.


BEFORE: The original Popex design called for use of metal legs, blanked, formed and plated. Also required plastic bumper buttons attached with rivet and washer. Two rivets attached each leg to base plate.
AFTER: Plastic legs having integral studs are inserted through punched holes in side of base plate. Push-On SPEED NUTS are zipped over studs with hand tool. SPEED NUT prongs "bite" into plastic, holding leg securely.
TINNERMAN
Speed Nut

YOU'VE NEVER SEEN EXTRUSIONS LIKE THESE BEFORE



R. H. Windsor Ltd.

MANUFACTURERS UNDER L.M.P. PATENTS
16 Finsbury Sq. London E.C. 2 England

GASOLINE HOSING *(upper left)* Hard vinyl spirals extruded over soft vinyl core in one operation. Flexible.

MULTI-COLOR BELTING *(lower left)* Up to 54" wide. Made on as many as ten RC-3's operating through a single crosshead.

CHEMICAL TUBING *(upper right)* Rigid or flexible. Resistant to most chemicals. Extremely accurate dimensions.

CORRUGATED TUBING *(lower right)* Extrudable with continuous corrugations or with straight end sections.

made at low cost on the versatile "twin-screw"

RC-3

PATENTS APPLIED FOR

J-C

Foolproof in operation. A complete organization exists in the United States for installation and service

Until the RC-3 was recently unveiled, extrusions like these were completely unknown. Imagine a flexible vinyl tube 2' in diameter with bands of contrasting colored vinyl embossed into its surface. Imagine a flexible gasoline hose with a soft polyvinyl center and a protective *spiral* shell of hard vinyl. Imagine extruded sheet up to 72" wide. Imagine multi-colored belting and tubing with as many as ten individual, distinctly separate colors.

There's really no need to imagine . . . you can actually make any of these and many other unusual, widely marketable extrusions in your own plant at extremely low cost on RC-3 "twin-screw" extruders. There are extensive outlets for these startling innovations in extrusion in the electrical, chemical and petroleum fields, in packaging, in home furnishing, in upholstery, in the automotive industry, in display creation, in the building construction trades and many others.

IT'S LIGHT, SMALL INEXPENSIVE

Despite its giant's capacity for work, the RC-3 tips the scale at less than a ton and occupies scarcely eight and a half square feet of floor space.

And best of all, the low price of the RC-3 entitles you to the *know-how* of its manufacturer, the world's leading authority on specialized crosshead extrusions. Made available to you will be detailed instructions on how to produce multi-colored extrusions, laminated extrusions in sheet and tube form, spiral extrusions and many others.

IT COMPOUNDS AND RECLAIMS SCRAP, TOO

The interacting "twin-screws" of the RC-3 allow you to use it for coloring and compounding thermoplastic materials and for reclaiming scrap. Their powerful action is sufficient to mix all thermoplastics in just a single pass. Materials compounded or reclaimed in this manner on the RC-3 cost you much less per pound than do materials which are processed by ordinary methods.

Write for complete details.

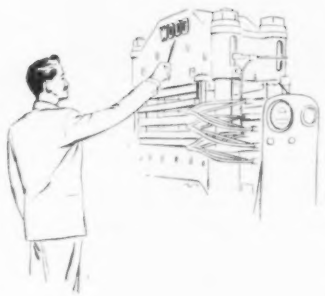
Jackson & Church

COMPANY

SAGINAW MICHIGAN

WORK WELL DONE, SINCE '81

the wisdom of doing business with R. D. Wood



The industrial buyer today is looking more and more closely at the comparative feature-for-feature value of the products he buys.

It has become increasingly necessary for his purchases to justify themselves on the basis of sound business economy—for increased production, better quality in output, rapid self-amortization, or some similar factor.

This situation is healthy. In fact, it fosters the competition desirable under the American free enterprise system.

Under this system, those industrial products which have maintained high excellence in manufacture will continue to be sold, and will contribute their worth to uplifting the general quality of everything produced in industrial America.

We at R. D. Wood have believed in this principle—and manufactured by it—since our Company was founded back in 1803. Our hydraulic presses and equipment for the metalworking, plastics, rubber, and plywood industries have always withstood alert purchasing scrutiny. We have invited, and will continue to invite, feature-by-feature examination and comparison of our products.

You'll never find an inferior piece of hydraulic equipment with the name WOOD on it. We have found that in almost 150 years of doing business, this type of unrelenting policy is nothing less than wisdom.

• • •

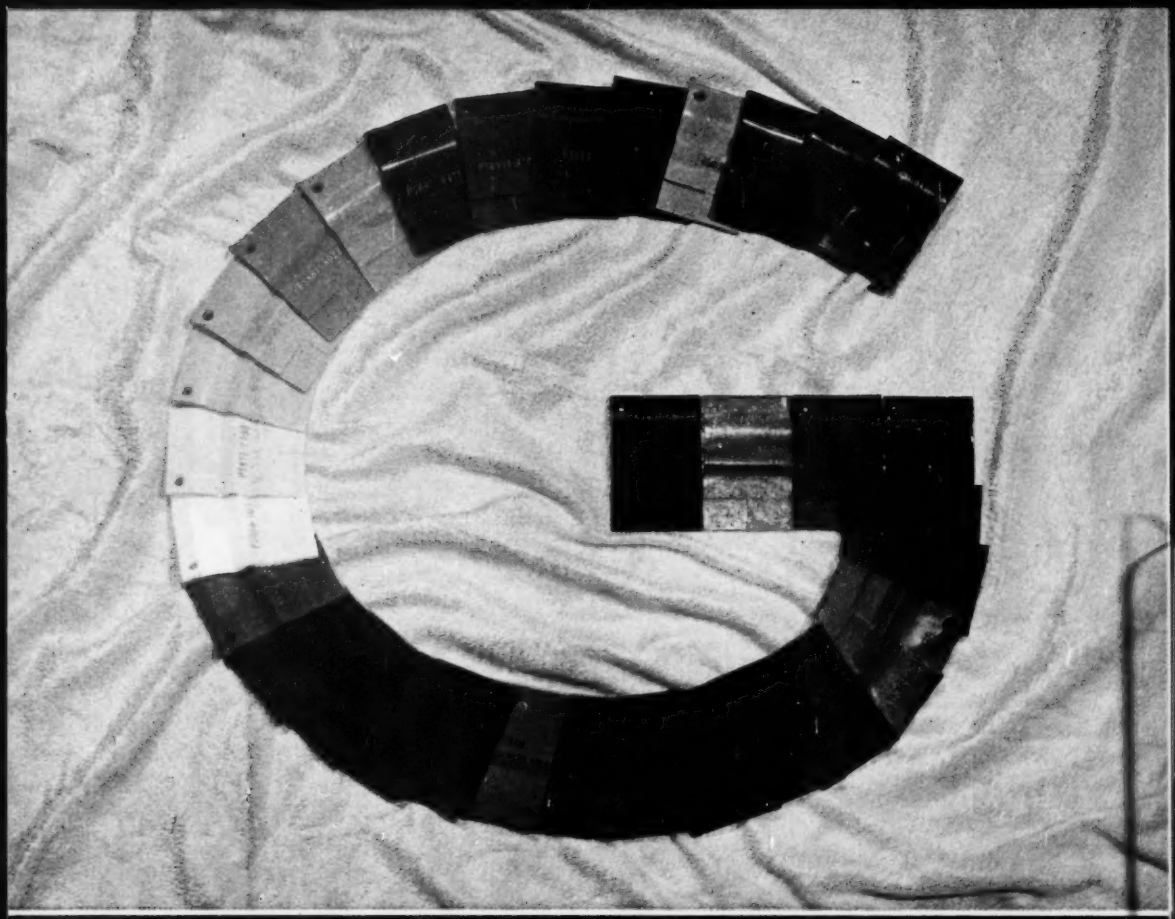
Write for R. D. Wood catalogs on hydraulic presses and equipment.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

EST. 1803

R. D. Wood Company

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.



Facilities behind GP symbol

Twenty-seven years ago, Gering Products Inc., Prime Producers . . . Custom Converters of Molding Powders was founded . . . Through the years GP Molding Powders, produced under rigid analytical control, have set a high standard of quality . . . Colored in every hue of the spectrum, GP specially lubricated Molding Powders feature . . . uniformity of color . . . easier molding . . . quicker molding cycles . . . adaptability to mass production with less rejects . . . Backed by production on a large scale and coupled with technical resources, research and sales departments which offer practical service and assistance on all problems in the use of Molding Powders, GP has been accepted through customer satisfaction and by their continued maintenance of Quality . . . Service . . . Dependability.

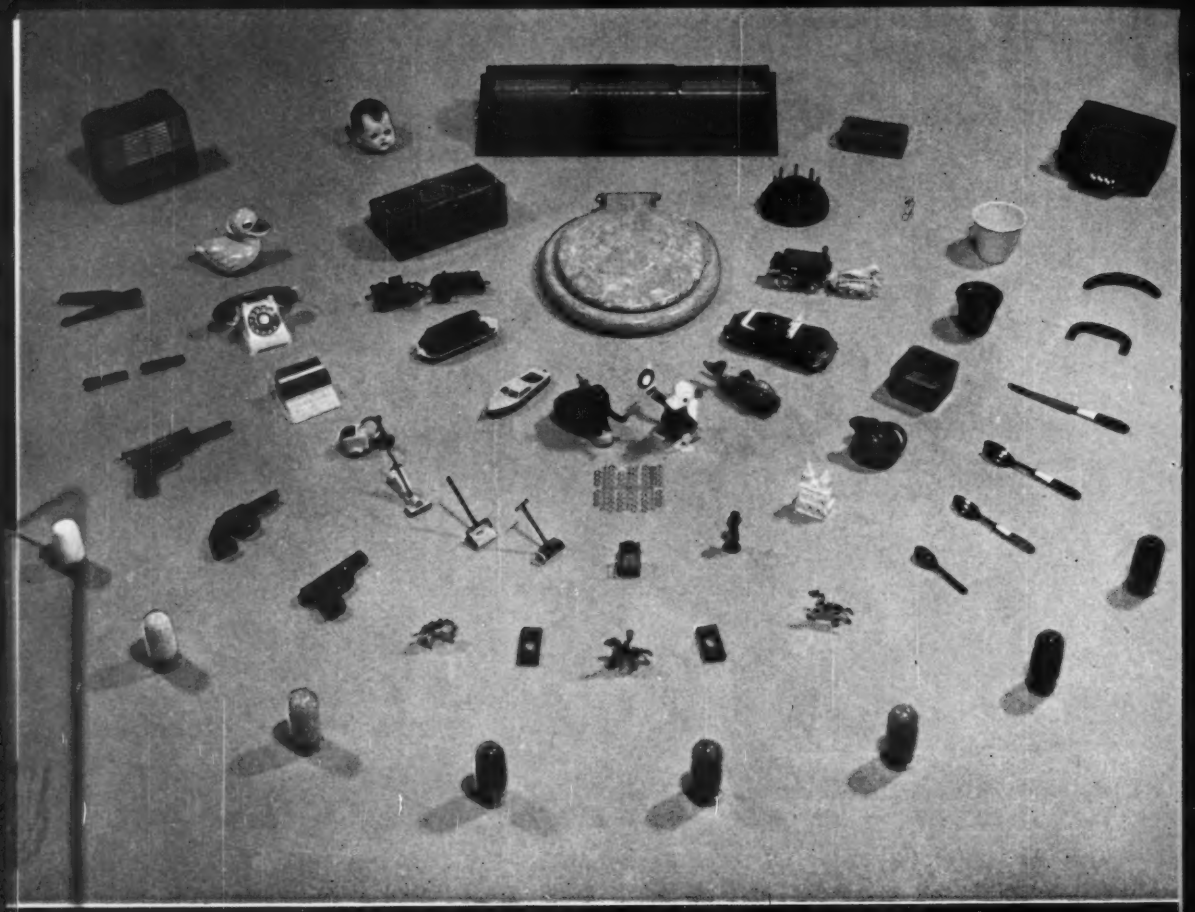
GP

PLASTIC MATERIALS

"Gering engineering makes fine plastics better"

GERING PRODUCTS, Inc.

CABLE ADDRESS: GERING KENILWORTH, N. J.



GERING CREATES A *legend* IN COLOR

Gering molding powders have created a legend of customer satisfaction throughout the world, because of their rigid quality control . . . uniformity of color, and faster molding cycles.

GP by analyzing the "end result" desired . . . selects material and process, then efficiently and economically produces the required powder or color for your molding problem.

"Gering engineering makes fine plastics better"

GP

PLASTIC MATERIALS

GERING PRODUCTS, Inc.

CABLE ADDRESS: GERING KENILWORTH, N. J.

OLSEN BULLETIN #36

COVER TO COVER

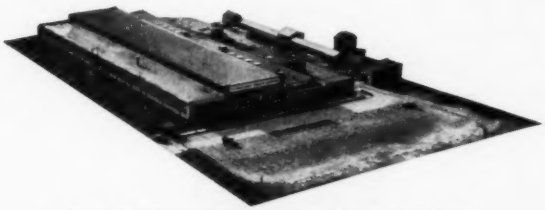
IT'S FULL OF INFORMATION ON

The Testing of PLASTICS

No it's not an easy job to compile a complete story on the physical testing of plastics but now that it is an accomplished fact we're glad to pass it on to you.

Olsen Bulletin #36 gives in detail the story of every type—and there are over twelve types—of Olsen testing equipment made especially for the testing of plastics. The story of the Plastiversal—Universal Testing Machine, the LO-CAP, the Torsion-Stiffness, the Impact, the Stiffness, the Flow Testers, the Heat Distortion Testers, and many more are included—from initial discussion to complete specifications of each machine. There's a section too on the exclusive Olsen Electronic Recorders and the specialized accessories and tools.

This up-to-the-minute Bulletin, which the plastics industry has been demanding, is just off the press—write today for your copy—it's the Olsen Bulletin #36.



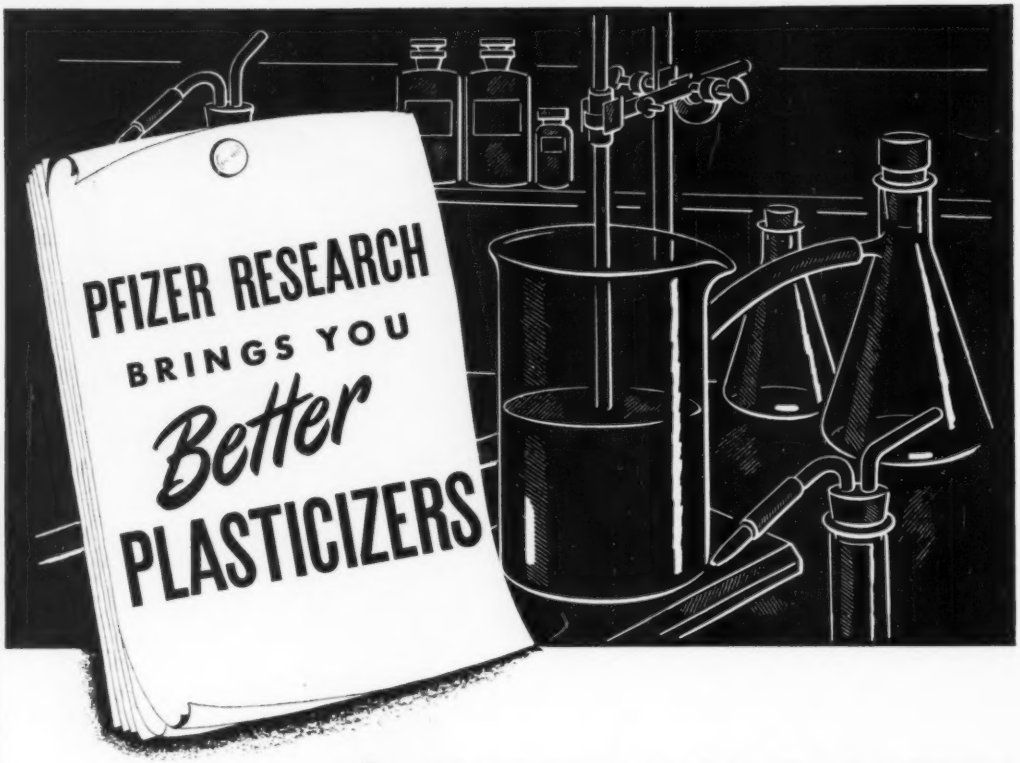
We will be glad to show you our new plant on Easton Road, Willow Grove, Pa. (Suburb of Phila.). Over 100,000 square feet of area all on one floor devoted exclusively to the manufacture of testing and balancing equipment.

TINIUS OLSEN

Testing & Balancing Machines

TINIUS OLSEN TESTING MACHINE CO.

2050 Easton Road, Willow Grove, Pa.



Buyer preference for your finished plastic product depends on many factors—an important one being your choice of the proper plasticizer.

Through continuing research Pfizer has developed a group of plasticizers from citric acid which have a combination of many desirable performance characteristics and which may solve your special problems. The citrate plasticizers in this group offer special advantages to you because of the versatility of the citric acid molecule, which contains one hydroxyl and three carboxyl groups and offers possibilities for tailor-made plasticizers. Among them are several which have proved particularly successful with cellulose acetate, vinyl and other resins.

Write our Technical Service Department regarding your plasticizer problems. Samples and technical information will gladly be supplied, and are worth your investigation. Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 425 N. Michigan Ave., Chicago 11 Ill.; 605 Third Street, San Francisco 7, Calif.

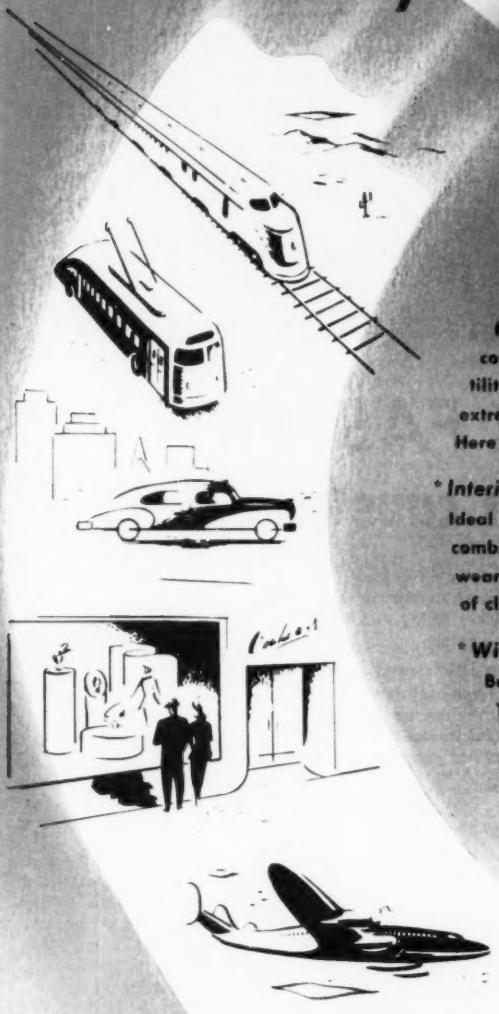
PFIZER

Manufacturing Chemists Since 1849

SWEDLOW

Producers of **PLYON***

LAMINATED MATERIALS



* **PLYON** is our trade name for the many types of laminated materials we produce. It is obtainable in various resin formulations and in a multitude of filler constructions which may consist of nylon, Fiberglas, cotton and paper... singly or in combination. The versatility of our low pressure laminating equipment provides extreme latitude in the manufacture of the end product. Here are only a few of the practical uses of PLYON:

* ***Interior Lining for Transportation...***
Ideal for buses, trucks, taxis, aircraft and trains because it combines impact strength to withstand the toughest kind of wear with "beauty appeal"... plus fire resistance and ease of cleaning.

* ***Window and Store Displays and Stage Settings...***
Backgrounds, decorative accessories and display units. Translucent to light and of extreme lightness for ease of transport and economy of shipment.

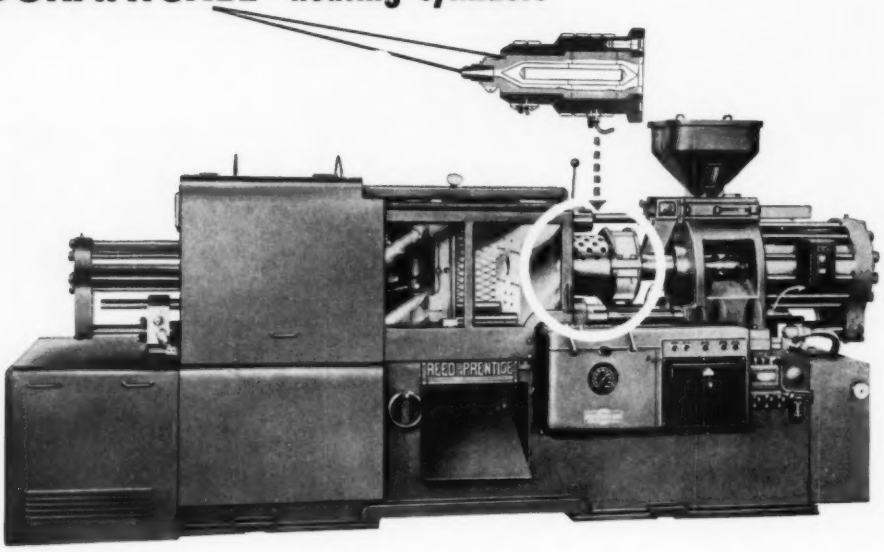
* ***Fuel Cell Backing for Planes...***
Plastic backing for self-sealing Fuel Cells in accordance with the AAF Specifications 12042 and Navy Specification M 717.

Also, 15 years experience as leaders and pioneers in Fabrication of Acrylic Resins and other transparent mediums

Swedlow PLASTICS CO.

3757 WILSHIRE BOULEVARD · LOS ANGELES 5, CALIFORNIA

World-famous Reed-Prentice machines with "*DURANICKEL*" heating cylinders—



Plasticize up to 20% *FASTER*— Readily cleaned with caustics

The Reed-Prentice Corporation has developed a new heating cylinder for their 10D-8 and 10 Oz. plastic injection molding machines.

Made with cylinder and nozzle of Duranickel*, the new heater plasticizes a wide range of moldable plastics, including polystyrene, vinyl resins and all the cellulose compounds. *It permits up to 20% faster production than was previously possible, says Reed-Prentice, yet operating temperatures have actually been reduced as much as 15%.*

The problems common in injection machine cylinders — metallic contamination, wear, abrasion and galling—have been satisfactorily overcome by the use of Duranickel.

And mechanical cleaning is eliminated — a short soaking in caustic soda makes Duranickel ready for the next job — in *any* color.

Especially suited for plastic extrusion dies, Duranickel has high heat treated hardness, high resistance to corrosion. And it withstands wear and abrasion by granular plastic.

Thermally hardenable to Rockwell C40-45after fabrication, Duranickel — like all INCO Nickel Alloys — is stronger and tougher than mild steel, and yet as corrosion resistant as pure nickel itself.

The Duranickel cylinder helps provide faster and more uniform heating. What's more, rejects are minimized, downtime for maintenance and replacement reduced.

Duranickel heating cylinders are available on new Reed-Prentice machines. Duranickel heaters can also be supplied for the 10D-8 Oz. machines you now have. Get full information about the complete line of 4, 8, 10, 12, 16 and 24 Oz. capacity machines with Duranickel heating cylinders by writing REED-PRENTICE CORPORATION, Dept. DN, Worcester, Mass.

And be sure to remember the advantages of Duranickel for other plastic molding applications. Better still, let us send you the complete story on Duranickel now. Then you'll have all the facts handy when your next "problem" turns up.

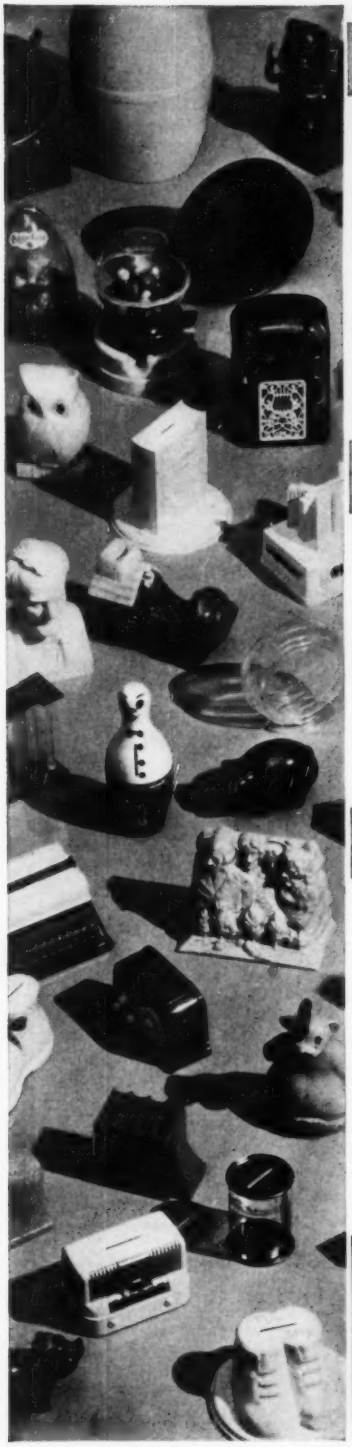
* Reg. U.S. Pat. Off.

DURANICKEL (formerly "Z"* Nickel)

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

NICKEL (INCO TRADE MARK) ALLOYS

MONEL* • "K"* MONEL • "R"* MONEL • "KR"* MONEL
NICKEL • "D"* NICKEL • "L"* NICKEL • INCONEL*
DURANICKEL*, PERMANICKEL*, INCONEL "X"*



Savings...

... in materials, in production costs . . . are paying off in dollar profits for the molders of these toy banks, and for thousands of other manufacturers of plastics products.

with EXTRA Interest

Special dividends in sales appeal—a rainbow range of sparkling colors, toughness, light weight, and pleasant touch—bring extra customer interest, help move these plastic banks quickly and profitably.

in LUSTREX . . . . . .

Everyone's looking for ways to save, to cut costs without sacrificing quality.

Like the manufacturers of these toy banks, who found real savings and extra customer interest in Monsanto Lustrex Styrene, you can gain extra dividends in better, faster-selling products, in low cost production, with Lustrex.

You'll discover a *bigger dollar's worth* in top quality, constantly improved materials plus sound, technical assistance and advice on materials and methods through the Monsanto Plastics Technical Council. Lustrex: Reg. U. S. Pat. Off.

Savings-minded molders with costs to reduce and sales to accelerate will profit by investigating the special advantages of Monsanto Plastics. There's real sales power in Monsanto's manufacturing and merchandising that means more profit for Monsanto customers. Find out how you can benefit from Monsanto's sure-footed, sales-building program. Write for information or use the handy coupon.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division
Dept. MPLP 34, Springfield 2, Mass.

Please send me "What Monsanto Plastics Can Do For YOU."

Name _____ Title _____

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Products Manufactured _____

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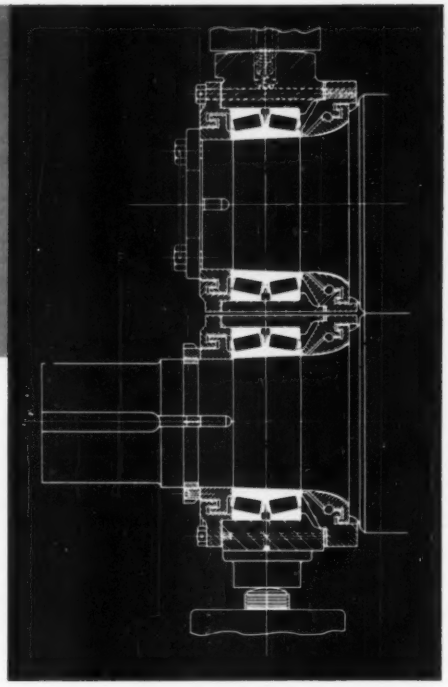
City _____ Zone _____ State _____

How Timken® Tapered Roller Bearings Help To Improve Plastics Production --Modify Costs



Timken bearing application for roll necks of plastics and rubber mills.

In plastics mills the use of Timken Balanced Proportion Bearings helps to make mills more rigid, because these bearings make possible larger roll neck diameters, with 50% to 60% increased roll neck strength and correspondingly higher bearing load ratings — up to 40% higher than with previous designs of tapered roller bearings, size for size.

In plastics calenders, where precision is the all-important factor, Timken bearings have proved their ability to provide and hold the extremely close gauge tolerances required in rolling the finest plastic sheet and film.

The advantages and versatility of Timken bearings are made possible by (1) scientific tapered design, (2) ability to carry radial, thrust and combined loads, (3) line contact of rolls and races assuring alignment of revolving parts, (4) superfine surface finish of rolls and races for utmost smoothness of operation and minimum wear.

Make sure you have Timken bearings in the machines you build or buy. Look for the trade-mark "TIMKEN" on every bearing.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO • CABLE ADDRESS "TIMROSCO"

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

TIMKEN 50 YEARS

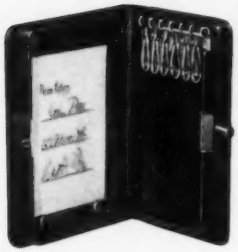
Smoothing the Path of Progress for 50 Years

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ←◫→ LOADS OR ANY COMBINATION

Clearly a Product Asset

PLAX POLYFLEX®

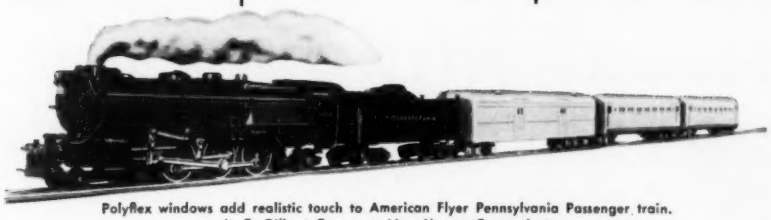
BRILLIANTLY TRANSPARENT • LOW IN COST • EASY TO FABRICATE



Key book with Plax Polyflex window for identification card. Made by Vogel Mfg. Co., Bridgeport, Conn.

Bird bath with colorful polystyrene roof and trough. Polyflex window. Made for Hartz Mountain Products, New York City, by Plastic Artisans, Inc., White Plains, N. Y.

Hershey Bar Bank typifies use of Plax Polyflex (windows) with molded polystyrene. Bank is product of G. Felsenthal & Sons, Chicago, Ill.



Polyflex windows add realistic touch to American Flyer Pennsylvania Passenger train. A. C. Gilbert Company, New Haven, Connecticut.

PLAX POLYFLEX polystyrene sheet combines sparkling clarity with high strength and extremely low cost.

Polyflex bonds quickly and securely to molded polystyrene parts. Users praise this fabricating advantage, because it reduces production costs, while it improves product or package construction.

Consider Polyflex now for your product or package. It's a bonus material in quality, cost and assembly. We will be glad to help you apply its beauty to your product.

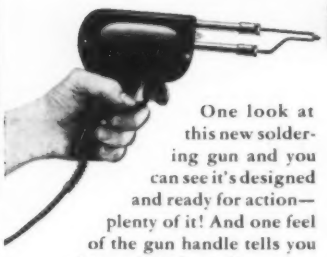
Write us for complete details.

PLAX CORPORATION DIVISION, HARTFORD-EMPIRE CO.
P. O. BOX 1019 ★ HARTFORD 1, CONNECTICUT
In Canada—Canadian Industries, Ltd., Montreal

OFFICES IN NEW YORK CITY, SYRACUSE, PHILADELPHIA, CHICAGO, AND ST. LOUIS

Gun and handle made by Weller Manufacturing Co., Easton, Pa. ** Made by Chemicals Division, General Electric Co., Pittsfield, Mass.*

Handle WITHOUT Care... it's made with HYCAR!



One look at this new soldering gun and you can see it's designed and ready for action—plenty of it! And one feel of the gun handle tells you this well-balanced, streamlined beauty is built to stand rough treatment and hard use.

For the handle is molded from a newly-developed Hycar-phenolic compound* that has unique advantages.

This new Hycar-phenolic compound gives molded parts a toughness and shock resistance far superior to that obtained with general purpose wood flour-filled phenolics. And Hycar imparts a resilience that enables molded parts to withstand abuse in assembly, shipping and handling.

In processing, too, it provides better molding characteristics . . . easier flow in the mold than straight phenolics . . . resistance to cracking around metal inserts in the mold.

Hycar
Reg. U.S. Pat. Off.
American Rubber

What Hycar American rubber does for this new compound may start an idea percolating for you. For Hycar is highly versatile. It is used as a base material . . . as a modifier for phenolic resins . . . as a plasticizer for polyvinyl resins . . . as an adhesive base . . . as a latex for coating or impregnating. For further information, helpful technical advice, write Dept. HN-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

SPECIAL PRESSES

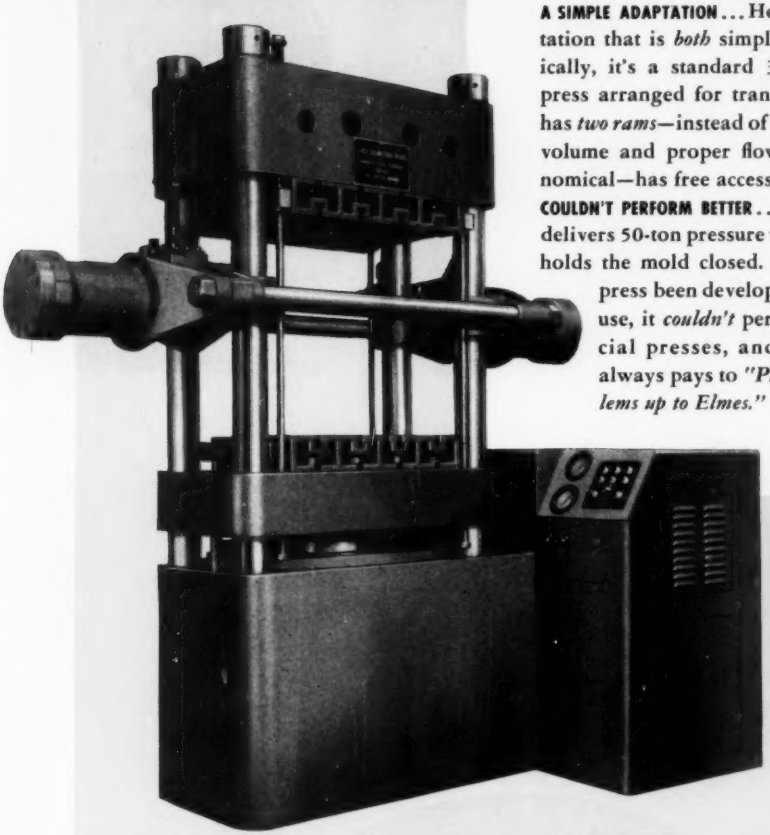
ENGINEERED BY ELMES

Good Hydraulic Production Equipment Since 1851

There are times when a *standard press* won't do. Then, it's time to call in Elmes. Whether the press you need is *special throughout,* or just changed from existing designs, Elmes background, facilities, and foresight are shortcuts to satisfaction *and profits.*

A SIMPLE ADAPTATION... Here's an Elmes adaptation that is *both* simple and effective. Basically, it's a standard 300-ton compression press arranged for transfer molding. But it has *two rams*—instead of one—to provide high volume and proper flow. It's compact, economical—has free access front and back.

COULDN'T PERFORM BETTER... Each transfer ram delivers 50-ton pressure while a *separate* pump holds the mold closed. And, had the whole press been developed for this particular use, it *couldn't* perform better. For special presses, and standards, too, it always pays to *"Put Your Pressing Problems up to Elmes."*



Ask for New Bulletin 5200-A. It's Free to Plastics Molders.

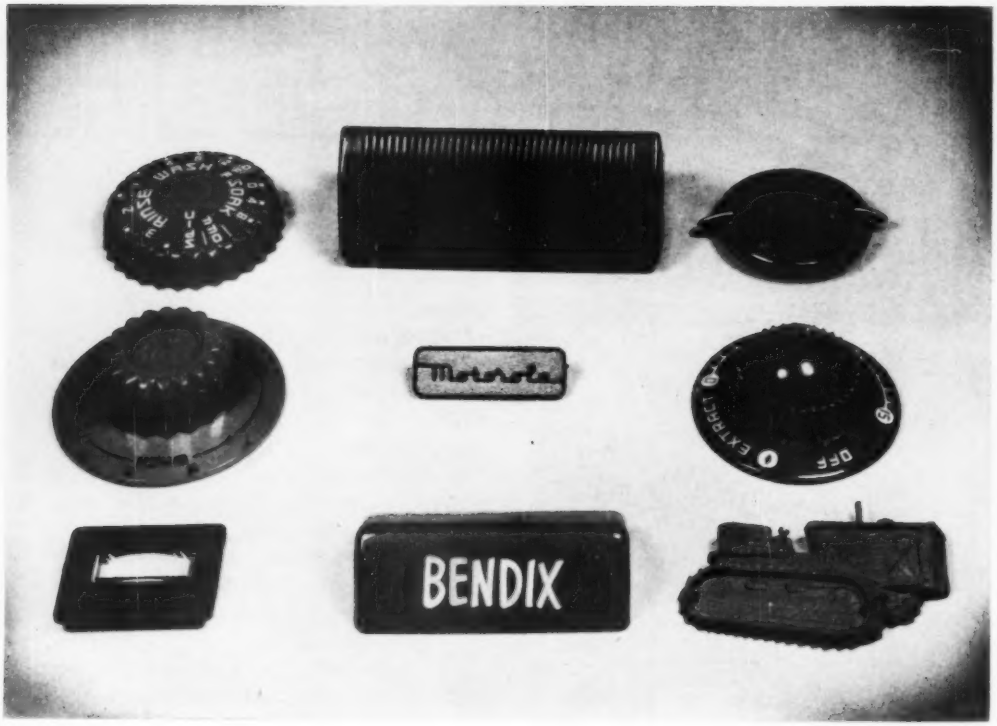
● You can speed plastics molding with modern Elmes equipment. Standard units include a full range of compression and transfer molding presses; Elmes Hydrolairs—the power presses with neither pumps nor motors; hobbing presses; laboratory presses; and Elmes pump-accumulator systems for group press operation.

Elmes hydraulic equipment does these four things—Saves Time... Saves Effort... Saves Maintenance... Saves Money. That's why leaders in the industry are Elmes users. Bulletin 5200-A gives features, specifications, and dimensions of Elmes equipment for plastics molders. Ask your Elmes distributor, or request by mail.

ELMES ENGINEERING DIVISION *of* AMERICAN STEEL FOUNDRIES, Cincinnati 29, Ohio

Distributors in Principal Industrial Centers • *Also Manufactured in Canada*

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES



CREATIVE CUSTOM MOLDING

Personalize your product with custom styled plastic molded accessories as illustrated above.

CRUVER, with facilities for molding, finishing, decorating and assembly, offer you a complete service on all forms of injection molding.

CRUVER MFG. CO.

Est. 1896

MOLDING • FABRICATING • LAMINATING • FINISHING
"BAS-RELEEF" • DECORATING • ASSEMBLY • SPRAYING

2460 WEST JACKSON BLVD., CHICAGO 12, ILLINOIS

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superior
low temperature
flexibility
top
plasticizing
efficiency
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DURITE
✓ SUPERIOR LUSTROUS FINISH
✓ HIGH PRODUCTION SPEED
✓ LOW FLASH LOSS
✓ ADEQUATE TORQUE STRENGTH
✓ UNIFORMITY
These properties characterize closures molded of DURITE Phenolic Compounds.
THE BORDEN COMPANY
Chemical Division
350 MADISON AVENUE, NEW YORK 17, N.Y.

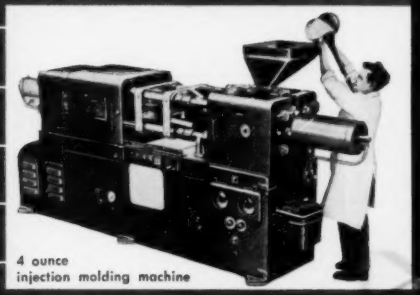
WINDSOR *Hi-Production* INJECTION MOLDING MACHINES

— top-notch molding performance

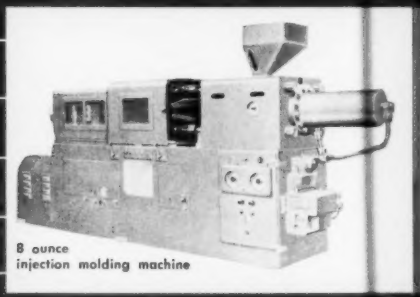
Fine injection molding machines by R. H. Windsor Ltd.—manufacturer of the world famous L.M.P. double-screw compounder-extruder — come in a complete capacity range for molding thermoplastic items of almost every size and shape.

To deliver suitable amounts of clamping and injection pressure, each Windsor injection molding machine is equipped with a balanced hydraulic system. In the smaller sizes, the machines have manual cycle controls; the larger capacity units feature fully automatic cycling, with provisions for manual control if desired.

Toggles, pressure plates, injection cylinders and plungers, tailstocks, tie bars and other parts which undergo pressure are made of high grade steel castings or of hard chromed alloy steels to prevent distortion or warpage. The fast even plasticization of the machines lowers molding costs. All Windsor machines are constructed for simplified maintenance and fast mold changing.



4 ounce
injection molding machine



8 ounce
injection molding machine

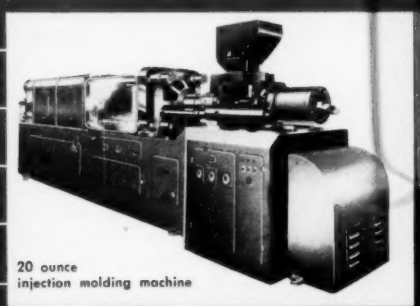
natural companions to any molding press

WINDSOR *Precision-Made* INJECTION MOLDS

R. H. Windsor's position as one of the world's leading mold builders is your guarantee of skill and precision workmanship. Design and construction of your molds by Windsor craftsmen insures the appearance and performance of your finished products.

Windsor-made molds take full advantage of the capabilities of your molding machine and the material you will use. Accurately machined to the tolerance required, they are polished to perfection to produce moldings with flaw-free surfaces.

Windsor is equipped to produce your injection molds from sketches, models, blueprints, or plans with utmost efficiency and precision. To facilitate estimates, complete details should be forwarded promptly.



20 ounce
injection molding machine

PLASTIC MACHINES

WRITE FOR DESCRIPTIVE LITERATURE

R. H. Windsor Ltd.

16 Finsbury Sq. London, E.C.2 England

MANUFACTURERS UNDER L.M.P. PATENTS

R. H. Windsor, Ltd. is exclusive manufacturer of the world-famous L.M.P. double-screw compounder-extruder for the British Empire, the United States and South America (excluding Brazil).

For Lower Assembly Costs—

FIT THE FASTENER TO THE JOB

with Parker-Kalon's Complete Line

With the need for cost reduction greater than ever, manufacturers are turning increasingly to Parker-Kalon Self-tapping Screws for more efficient product assembly.

Self-tapping Screws are designed to save assembly *time* — by eliminating such work-slowing operations as tapping, riveting, nut-running, and inserts in plastics. But the competitive advantages of this "short-cut" fastening method — lower production costs, simplified assemblies, improved product performance — can be lost with the wrong *type* of screw.

Parker-Kalon *fits the fastener to the job*. Originators of the Self-tapping Screw, and manufacturers of the only *complete* line, (a type and size for every metal and plastic assembly), Parker-Kalon's advice is completely unbiased.

Whether your product is in the planning stage or in production, it will pay you to call in a Parker-Kalon Assembly Engineer. He can demonstrate that, 7 times out of 10, P-K Self-tapping Screws save up to 50% in assembly workhours. Or, if you prefer, mail assembly details for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

IF IT'S P-K . . . IT'S O.K.!

The Original **PARKER-KALON®**

SELF-TAPPING SCREWS

FOR EVERY METAL AND PLASTIC ASSEMBLY

FOR HEAT RESISTANCE ON-THE-JOB... MOLD YOUR PRODUCTS OF PLEXIGLAS V

The Heat Resistant Molding Powder

Push-button controls on Hotpoint Electric Range—molded of PLEXIGLAS V.

Morning after morning, in homes all over America, high heat tests these plastic electric range switches. The switches beat the heat because they are molded of PLEXIGLAS V acrylic molding powder.

Unusually high heat-distortion temperature and remarkably low shrinkage give PLEXIGLAS V products their extraordinary stability in service. They resist distortion and retain their sparkling, water-white clarity—even after years of service.

Yet the flow temperature of PLEXIGLAS V Molding Powder is low—permits the molding of large quantities of identical parts in less time, at lower cost. Lettering, flanges, designs and other details may be molded in—reducing subsequent machining and assembling operations.

Along with heat resistance and superlative clarity, PLEXIGLAS V products possess lustrous beauty, outstanding strength and permanent resistance to age, weathering and breakage. Full details of these money-saving features are contained in our new folder. We'll be glad to send you a copy —plus samples of PLEXIGLAS V for testing.

CHEMICALS FOR INDUSTRY

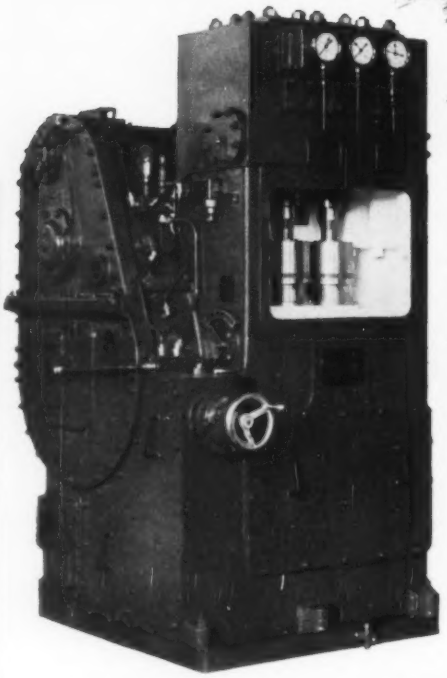
ROHM & HAAS COMPANY

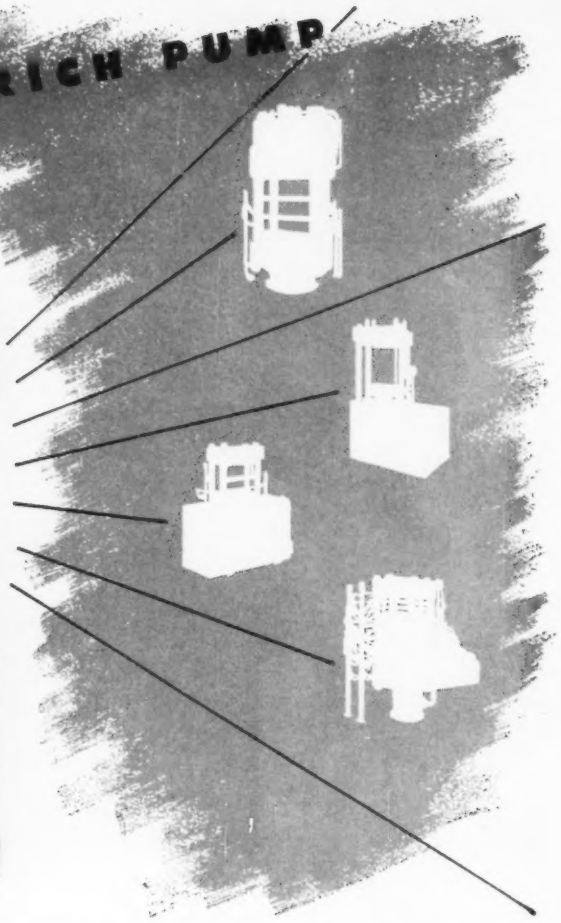
WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Canadian Distributor:
Crystal Glass & Plastics, Ltd.
282 St. Helens Ave., Toronto, Ont.

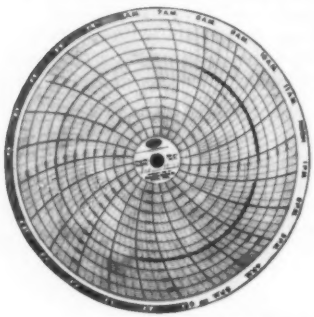
PLEXIGLAS *is a trade-mark, Reg. U.S. Pat. Off. and in principal foreign countries.*

USE One ALDRICH PUMP





For All Your Plastic Molding Presses



With one ALDRICH-GROFF "POWR-SAVR" PUMP, you can provide uniform hydraulic pressures for all your plastic molding presses and obtain the higher efficiency of a centralized hydraulic system at the same time.

The ALDRICH-GROFF "POWR-SAVR", a variable stroke, constant speed, variable capacity pump, will handle any free-flowing liquid—can be automatically controlled to provide stepless, straight-line variation from zero to rated maximum output. Working pressures up to 15,000 psi can be maintained and variance will not exceed 5% of that desired.

Centralize your system—you get compactness, quick accessibility, easy maintenance and greater economy. Write for technical details to—

THE ALDRICH PUMP COMPANY

6 GORDON STREET, ALLENTOWN, PA.

ALDRICH

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ALDRICH, THE FIRST NAME IN VARIABLE CAPACITY PUMPS

BAKELITE NEWS NO. 8

NOTES FROM BAKELITE CORPORATION ON BETTER, FASTER, LOWER COST PRODUCTION WITH "BAKELITE" PLASTICS

BAKELITE Phenolics Make WARM FRIENDS!

❶ Looking for a strong, lightweight, heat-resistant material? Your warm-friend-in-need may well be a BAKELITE Phenolic Plastic—as it is for this "Kodaslide" Projector, from Eastman Kodak. Its lens mount, barrel, top, and bottom, are rapidly and inexpensively molded with a smooth, lustrous finish that requires a minimum of finishing. All parts are assembled quickly. A plus value is its excellent electrical resistance. Do these good-looking projectors suggest the use of BAKELITE Phenolics in the parts or products you manufacture?

Molders: Auburn Button Works, Inc., and Waterbury Button & Mfg. Co.

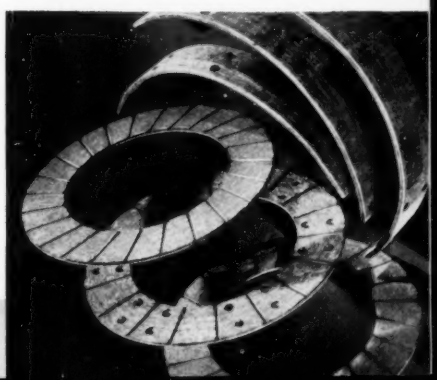
SALES Compelling Premiums Need Premium Quality Plastics

❷ That's why BAKELITE Styrene Plastics are used in the rear-view mirror glare shields included as premium offers with S. C. Johnson & Son's famous "Carnu" auto polish. BAKELITE Styrene Plastics come in virtually every color, transparent, translucent or opaque. They mold easily to close tolerances and fine detail—providing smooth, lustrous surfaces. They are ideal for toys, games, packages, novelties, premiums, brushes, combs, a thousand and one things.

Molder: Armstrong Products Co.

BAKELITE Bonding Resins Help Nearly EVERY INDUSTRY!

❸ Take these "Rusco" brake linings bonded with BAKELITE Phenolic Resins by the Russell Manufacturing Co. Longer service life is demonstrated, for example, on New York City taxicabs where they last nearly three times longer than linings formerly used. Clutch facings last longer, too. It's typical of the way the great variety of BAKELITE Bonding Resins are adding life and efficiency to many products such as abrasive wheels and sandpapers, and glass, mineral and vegetable fiber thermal insulation, storage battery plate separator retainer mats, and tuft binders for carpets and rugs. As sand core bonds for ferrous and non-ferrous metal castings, they're speeding foundry operations, lowering costs.



MORE BAKELITE NEWS ON NEXT PAGE

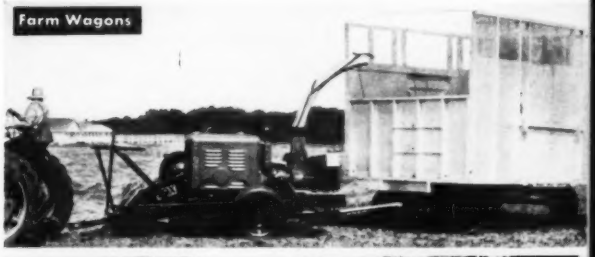
A BETTER TV Cabinet at LOWER COST

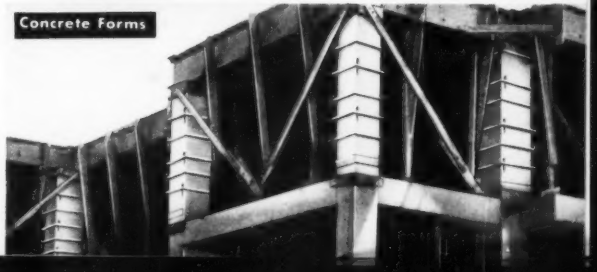
❹ Philco Corporation accomplished just that—with BAKELITE Plastics. Easily and inexpensively molded, the BAKELITE Phenolic cabinets of Philco's new 7 and 10 inch direct-view table-type TV sets permit fast mass production at lowest cost. The cabinets are molded in one piece with all lugs, chassis mountings, and openings completed at the same time. Color and permanent lustrous finish are self-contained. The lower cost helps bring television to more people which means broader markets for Philco.

Molders: General Industries Co., and American Insulator Corp.

Immense New ADVANTAGES in Plastic-Surfaced PLYWOOD!

❺ Paper-plastic surfacing offers these qualities to plywood: Armor-clad resistance to wear and weathering, higher tensile and flexural strengths, greatly decreased moisture absorption, and a better surface for painting. Kimberly-Clark Corp. impregnates a special paper stock with water-soluble BAKELITE Phenolic Resins. Sheets of this "Kimpreg" material are then laid up with the glue-spread assembly of wood plies. The lay up is cured in a hot press. The paper-plastic surfacing is anchored permanently to the plywood. The resultant product is sold by Georgia-Pacific Plywood and Lumber Co. as GPX Plastic Plywood. It is widely used for concrete forms that can be re-used many times; shipping cases, farm buildings and wagons, production-line chutes and tables, marine decking, linings for freight cars and trucks, and sidings for buildings.





Bakelite

TRADE-MARK

PLASTICS

BAKELITE CORPORATION

Unit of Union Carbide and Carbon Corporation UCC

30 East 42nd Street, New York 17, N.Y.

Design Changes Are Easy with Versatile, Adaptable Plastics!

Check coupon below for information on specific subjects illustrated. For general information, write for copy of Booklet G-8, "A Simplified Guide to BAKELITE and VINYLITE Plastics."

BAKELITE CORPORATION, Dept. C-13
30 East 42nd Street, New York 17, N. Y.

Please send information on subjects checked below:

- ☐ 1. BAKELITE Phenolic Plastics
- ☐ 2. BAKELITE Styrene Plastics
- ☐ 3. BAKELITE Bonding Resins
- ☐ 4. BAKELITE Phenolic Plastic Cabinets
- ☐ 5. Plastic-Surfaced Plywood

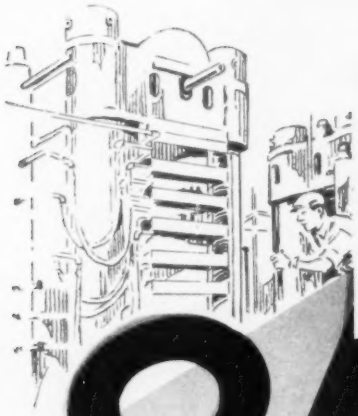
Name ..... *Title* .....

Company .....

Street .....

City ..... *Zone* ..... *State* .....

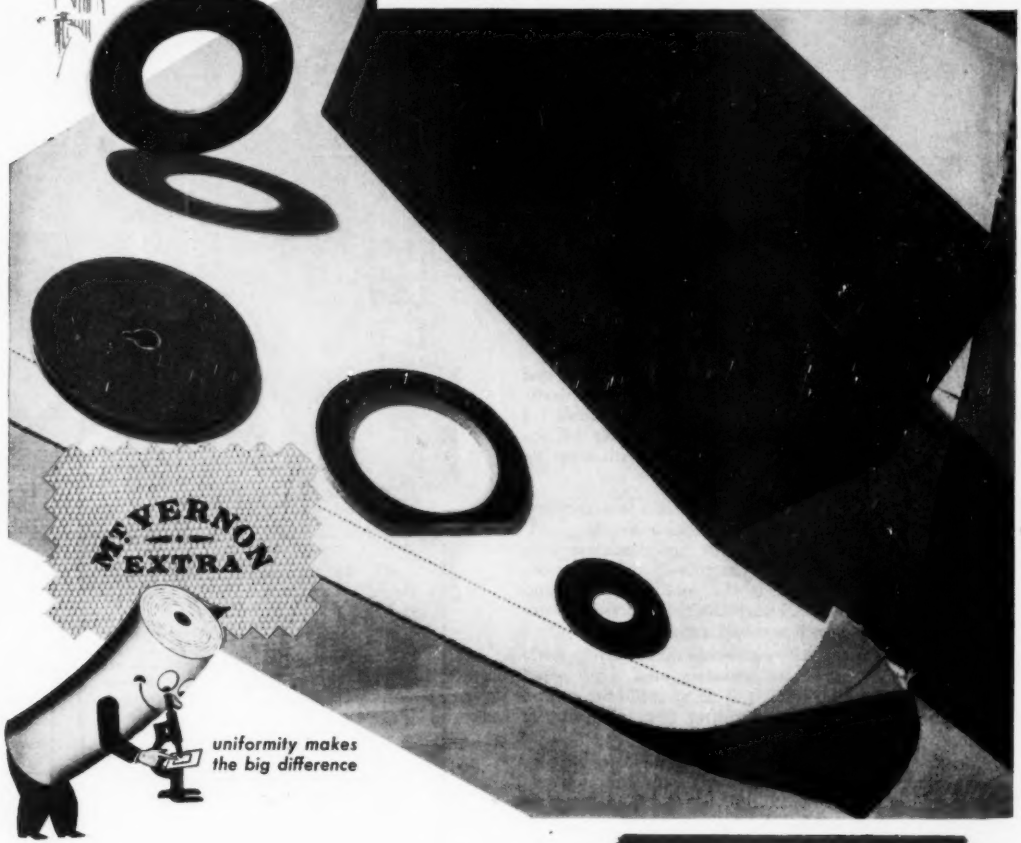
Better Penetration Means Better Lamination



Men who choose laminating fabrics know the importance of even resin penetration . . . know what it means to the ultimate strength and durability of the laminates they make.

That's why Mt. Vernon Extra gets first call in their specifications. Mt. Vernon's high degree of uniformity insures uniform resin penetration . . . because Mt. Vernon fabrics are produced from top grades of cotton under rigid laboratory controls to insure successful lamination.

For laminating fabrics specifically designed to make better laminates, choose Mt. Vernon Extra.



Mt. Vernon-Woodberry Mills

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COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

500 SQUARE INCHES

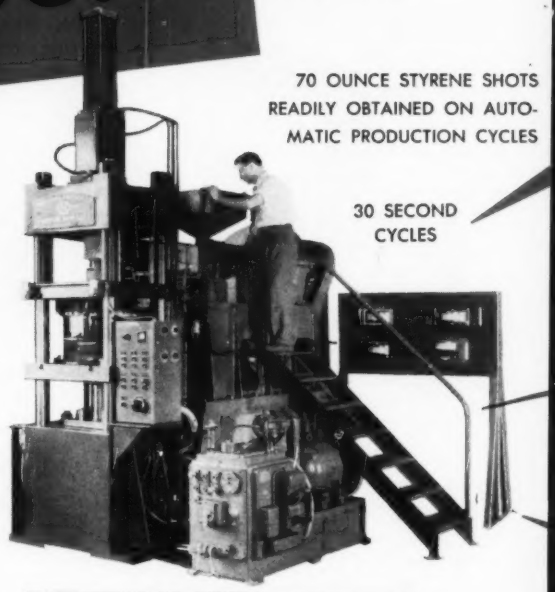
on a

48 OUNCE Injection Molding Machine for $37,500.*

AVAILABLE IN 8 - 20 - 48 - 64 - 80 OUNCE MODELS

70 OUNCE STYRENE SHOTS READILY OBTAINED ON AUTOMATIC PRODUCTION CYCLES

30 SECOND CYCLES



SHOOT SUPER-SIZE MOLDINGS (500 SQ. IN.) IN FAST CYCLES . . . AND TAKE IN SUPER-SIZE PROFITS

This sensationally new J-C Press**, embodying a new approach to injection molding . . . *operates under substantially lower injection pressures* . . . making possible a ratio of 1 ton clamp to each square inch of projected area as opposed to from 2 to 3 tons clamp per square inch on conventional machines.

The spectacular new J-C Press opens up a *new and practically untouched market* for large thermoplastic pieces and redesign of present multi-cavity molds for new operational profit. Then too . . . lower J-C injection pressures permit a lighter press with a saving in iron passed on to you.

Here's the explanation . . . The J-C Press is a complete departure from conventional injection molding machine design. The specially-built pre-plasticizer does three jobs: 1—it heats, 2—it completely and uniformly plasticizes, and 3—it feeds the molding compound directly into the vertical torpedo-less injection chamber in exact one-shot doses—all automatically.

The J-C Press is versatile and takes up relatively little floor space. It operates on *uninterrupted, high speed schedules* . . . cycle succeeds cycle at rapid-fire tempo with automatic timers controlling each step in the entire press operation.

Act now to insure your position in the field by writing today for detailed specifications, prices and delivery dates on the model (8, 20, 48, 64 and 80-oz.) whose capacity fits your needs.

Remember . . . *operating at lower injection pressures* gives you a real competitive approach to your market.

48 Oz. Machine Specifications

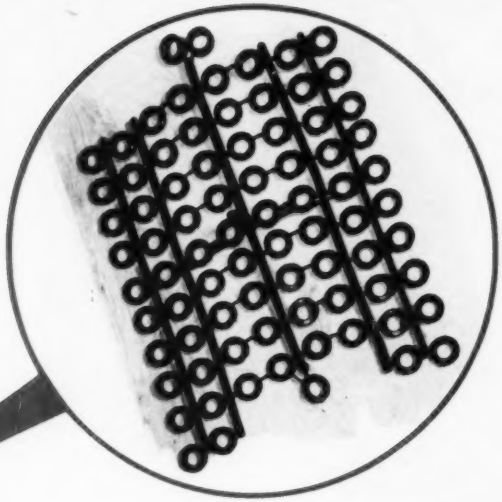
Ounces per shot	48 oz. Styrene
Total poundage per hr.	360 lb. Styrene
Pressure per sq. in. on material in injection chamber	10,000 p.s.i. max.
Diameter of plunger	3¼ in. diameter
Diameter of screw	3¼ in. diameter
Speed of screw	25 to 200 r.p.m.
Projected area	500 sq. in.
Locking pressure	600 tons
Stroke of clamp cylinder	30 to 36 inches
Speed of closing	350 in. per min. slowed down to 60 in. per min. for clamping
Speed of opening	425 in. per min.
Max. over-all height	18 ft.
Max. daylight opening	42 to 64 inches
Distance between tie rods	Left to right 36 in. Front to back 36 in.
Floor space required	94 sq. ft.
Approximate weight	60,000 lbs.
Speed of injection	194 in. per min. max. 20 in. per min. min.
Stroke of injection cylinder	14 inches
Extruder motor	30 hp. Fluid Drive Motor—Operated from pump motor
Hydraulic pump motor	50 hp

J-C

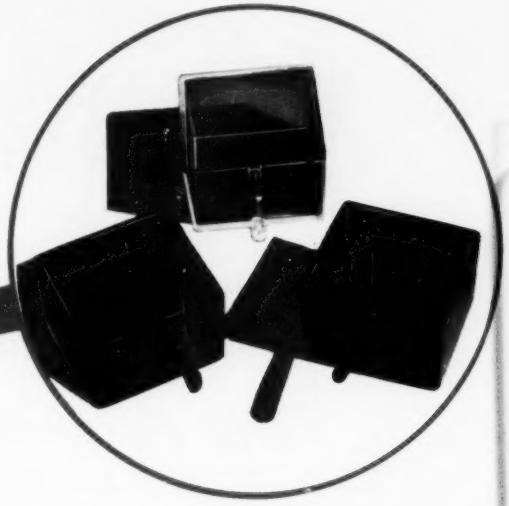
* DEPENDENT UPON STROKE AND DAYLIGHT OPENING

** PATENTS APPLIED FOR.

PROJECTED AREA...



LARGE PROJECTED AREA
64 oz. vinylite . . . 90 second cycle



LENS MATERIAL
14 oz. acrylic . . . 105 second cycle

STYRENE COLORED AND INJECTION MOLDED IN ONE OPERATION ON J-C PRESS

Here is welcome news: Injection molders may now, through use of the J-C Press, save 5c per pound and cut down inventories by coloring Styrene on our press.

No need to pre-color, pelletize or in any way treat pre-molded styrene. Simply buy all crystal styrene, augment with small quantities of required dye, dry mix crystal with dye, run through J-C Press and get total diffusion of color in molded parts.

Investigate this amazing development now . . . you will be able to revise your inventory downward and perfect pricing and plant operations.

NOTE: All molded pieces pictured here were molded on a J-C 48 oz. Press.

J-C JACKSON & CHURCH CO.

SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

PRECISION-MOLDED PLASTIC GEARS

Lick Finishing Cost Problem

FOR INDUSTRIAL RAYON CORPORATION

Overcoming cost problems with precision-molded plastic parts is not a new story with General Industries.

In this particular case, Industrial Rayon Corporation, already a user of many GI-molded intricate plastic parts, was faced with the problem of reducing finishing costs of a laminated bevel gear used in rayon production equipment. The obvious solution, based on past experience, was a one-piece molded phenolic gear, both chemical- and wear-resistant.

That's where General Industries entered the picture. First, a hobbed model with generated teeth . . . then the hardened steel mold with allowance for calculated shrinkage of the plastic gear while cooling . . . followed by a brief trial run to assure freedom from rejects in full-scale production. Meeting precision tolerances with unvarying accuracy, the new gears require no finishing operation, cost less and last longer than those formerly used.

Whether your own problem lies in the selection of the right plastic material to do a specific job, or involves detailed engineering assistance, you'll get prompt help toward an economical solution when you bring it to General Industries—one of America's foremost custom molders.

The GENERAL INDUSTRIES Co.

DEPARTMENT R • ELYRIA, OHIO

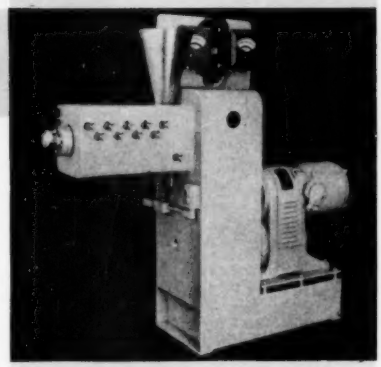
most plastics technicians

who know their business choose

mpm **EXTRUDERS**

You'll be following the lead of many of the country's foremost plastics extruders when you select MPM extrusion machines and auxiliary equipment. The experience of these organizations—and of others all over the world—has conclusively proven the high output, versatility and dependability of MPM equipment in making fine extruded products.

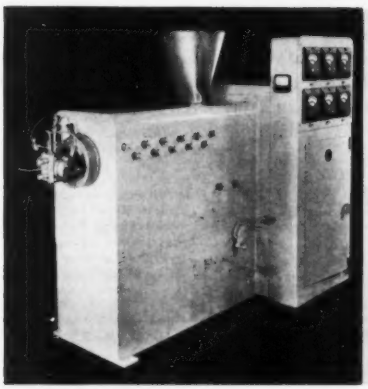
The superiority of MPM performance is no accident. It is a result of specific features (screw design, heat control, die head, etc.) which directly increase adaptability and production capacity. Send for particulars and descriptive literature.



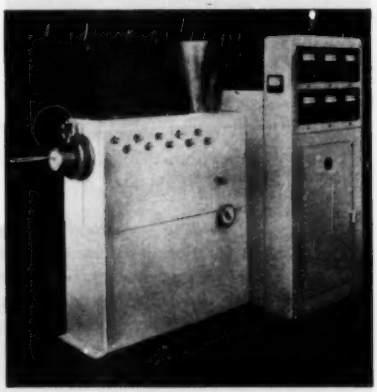
MPM 1½" Extruder This machine has been installed in scores of leading material suppliers' laboratories and in customers' plants. It handles a wide range of applications such as wire coating, blown film, rods, tubes, strips and the like. Materials extruded include Nylon, Kel-F, polystyrene, acetate, methacrylate, polyethylene, polyvinyl chloride and Formvar.

modern plastic machinery corp. mpm

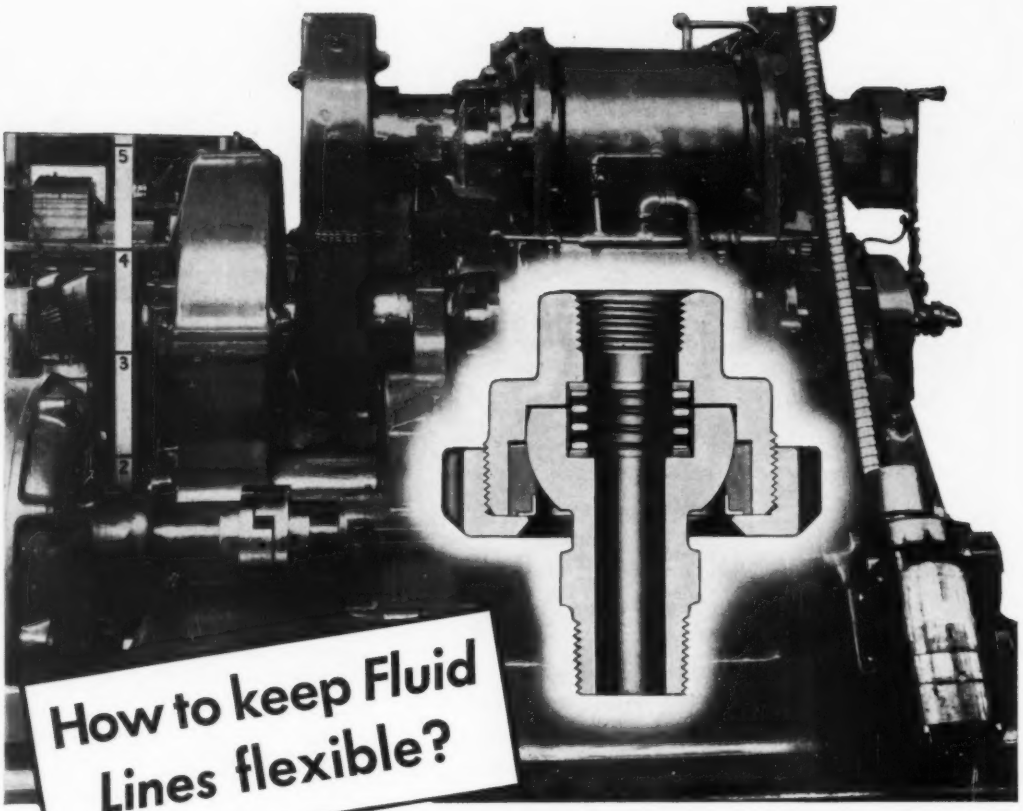
15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX



MPM 3½" Extruder An extremely high - production machine, the new MPM 3½" Extruder excels in covering wire, compounding and coloring resins, and in producing heavy cross sections and wide films. As much as 150 to 250 pounds per hour can be produced, depending on the materials and the application.



MPM 2½" Extruder The 2½" unit will extrude up to 125 pounds of polyvinyl chloride welting hourly, for example, and up to double the capacity of other machines with methacrylate. It can be furnished with a broad range of interchangeable heads and, like all other MPM extruders, it will extrude an extremely wide selection of materials.



THIS MACHINE USES BARCO JOINTS

This mixer, designed for the baking and rubber industries, is equipped with Barco Swivel Joints that permit easy tilting for unloading.

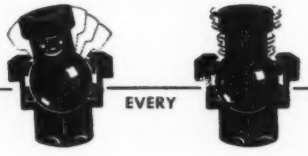
Providing such flexibility is no unusual job for Barco Joints. They perform many services on a wide variety of machines and fluid conveying systems, both simple and complex. Barco Joints are made to withstand hydraulic pressures of 2500 pounds. They are unique in their ability to absorb shock and misalignment strains, due to a combination ball and swivel action.

Throughout the last 33 years, Barco engineers have solved thousands of problems relating to flexible connections. Their experience and technical skill are at your disposal. Write Barco Manufacturing Co., 1809 Winnemac Ave., Chicago 40, Ill. In Canada: The Holden Co., Ltd., Montreal, Canada.

BARCO ***FLEXIBLE JOINTS***

Not just a swivel joint ...but a combination of a swivel and ball joint with rotary motion and responsive movement through every angle.

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY



"MOVE IN EVERY DIRECTION"

The story of a "Reel" success

Reels for sound recorders, in homes, schools, institutions and radio stations. Made of Koppers Polystyrene 8 by Minnesota Mining & Manufacturing Co., Minneapolis, Minnesota.

● It seems simple enough to make a satisfactory reel for a magnetic tape recorder or a home movie outfit — but manufacturers know differently. They've tried various kinds of metals, fibre, cardboard and plastics. Some reels would bend out of shape, become noisy, or break the tape. Others could not stand the mechanical abuse or would warp due to heat.

A Koppers salesman was discussing the problems with a certain manufacturer and suggested Koppers Polystyrene 8—the low-cost, rigid plastic with a high heat-distortion temperature. They tried it—with immediate success. They found that Polystyrene 8 had the necessary resistance to heat . . . it had ample mechanical strength . . . did not bend out of shape when dropped . . . and was much quieter in service than metal reels.

What's more, the low price of Koppers Polystyrene 8, its easy moldability and fast molding cycle made it possible to produce reels in great quantity and at low cost. As a result the reel is widely used in homes, schools, institutions and radio stations. This is another instance where a Koppers Perfected Plastic has helped a manufacturer solve a tough problem.

What is your problem in plastics?

Koppers makes various types of Polystyrene to suit different applications. Our technical staff is ready at all times to help you improve your designs and to recommend the *best* plastic for your particular application. Bring your plastics problems to Koppers.

KOPPERS COMPANY, INC.
Chemical Division Pittsburgh 19, Pa.
Regional Offices: New York, Boston, Chicago and San Francisco

KOPPERS

Koppers Perfected Plastics

Koppers Company, Inc.
Chemical Division, Dept. MP-12
Pittsburgh 19, Pa.

Please send me ☐ a sample of Polystyrene 8.
☐ information on Koppers Plastics.

Name..... Title.....

Company.....

Address.....

City..... State.....

Improve Your Packages with

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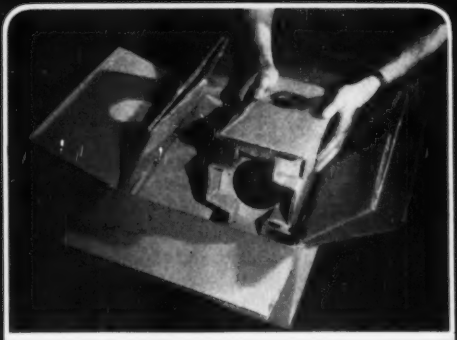

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Santicizers 141 and 160 are but two of a long list of Monsanto Plasticizers, each having definite functions in plastics, coatings or rubber. Santicizers have excellent processing characteristics for films, coatings, extrusions or molded products. New low prices offer you production economies. Look into the advantages you can gain from using Santicizers. For complete details, quotations and samples, mail the coupon, contact the nearest Monsanto Sales Office or write: MONSANTO CHEMICAL COMPANY, Desk H, Organic Chemicals Division, 1707 South Second Street, St. Louis 4, Missouri.

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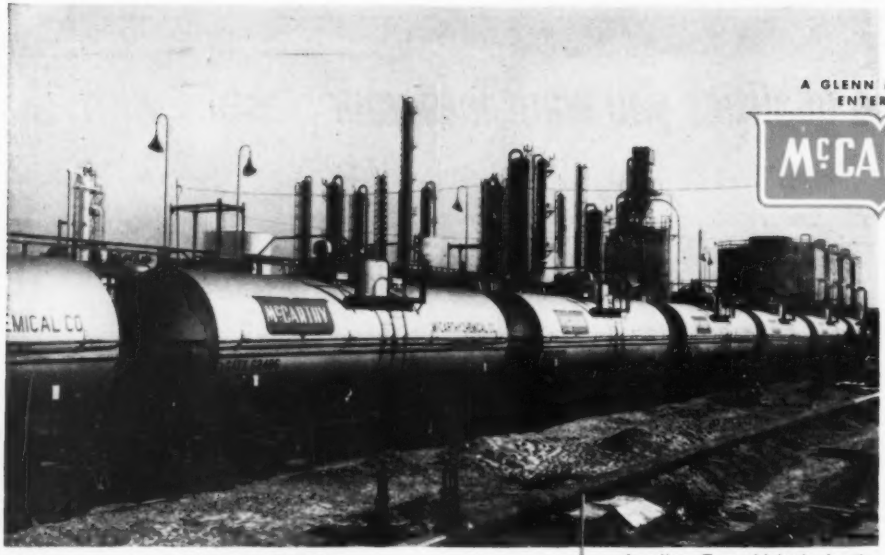

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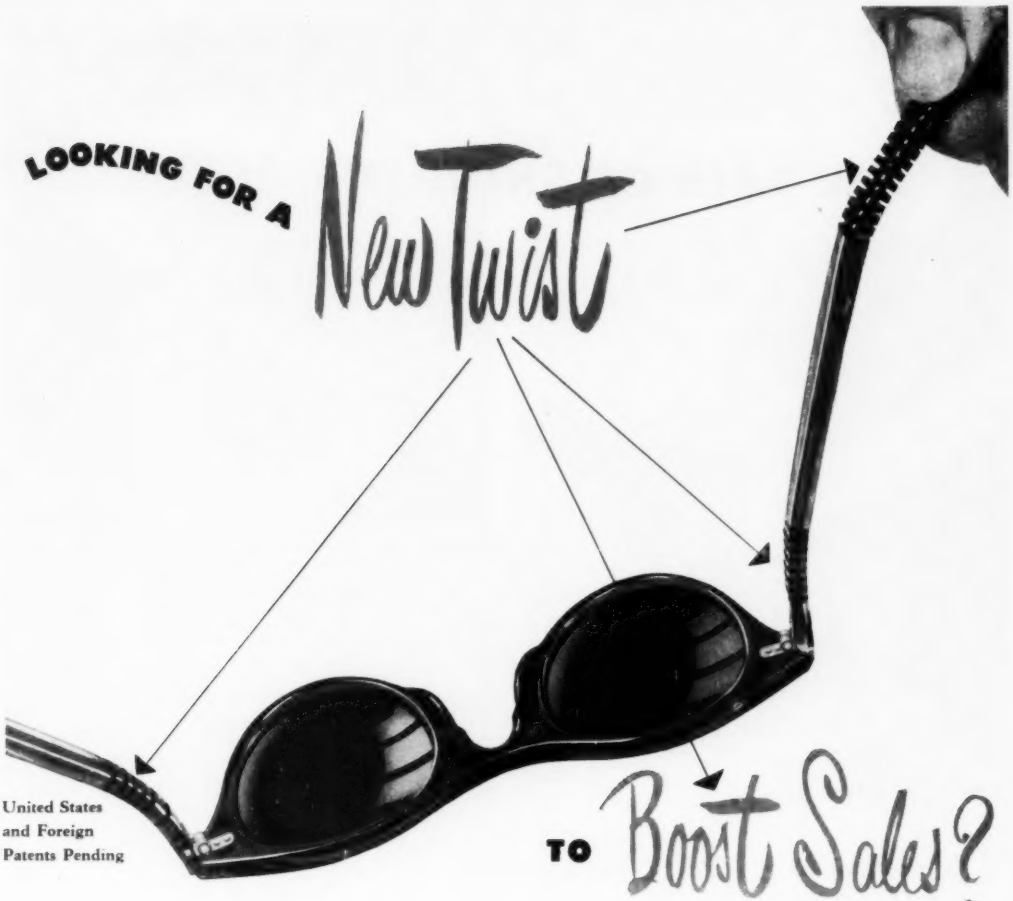

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Another profitable line made by the American Anode process

OVERSHOES for winter weather—and Beach Shoes for barefoot play in summer—made of pure latex by the American Anode process—favorites everywhere!

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The American Anode process makes this feather-weight, wear-resisting footwear possible. It's a patented method whereby latices and mixes are deposited and converted to solid materials, on a wide variety of forms. If your products are in the textile, paper, toy manufacturing, medical or electro-plating fields, find out how American Anode may help you improve products, or develop new ones profitably.

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RECENTLY, the Horrocks-Ibbotson Company, Utica, New York, changed over to automatic molding, with Stokes fully automatic plastics molding presses. Production of the side plates for their famous Sea Level Winding Reel was increased from 60 per hour to 270 per hour. Press labor cost was cut 90%.

In addition, a two minute molding cycle was obtained with the 9-cavity mold on the automatic press, with a minimum of flash, and almost no deburring costs. Previously, 6-cavity hand molds required six minutes molding time, with medium flash, and high deburring costs.

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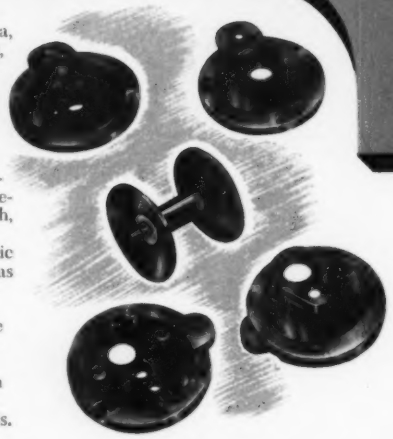
Stokes completely automatic molding machines are cost-saving units . . . designed to produce precisely accurate parts, economically and dependably.

Stokes can tell you whether your plastic parts can be profitably produced by automatic molding . . . just send the parts or blueprints for free analysis.



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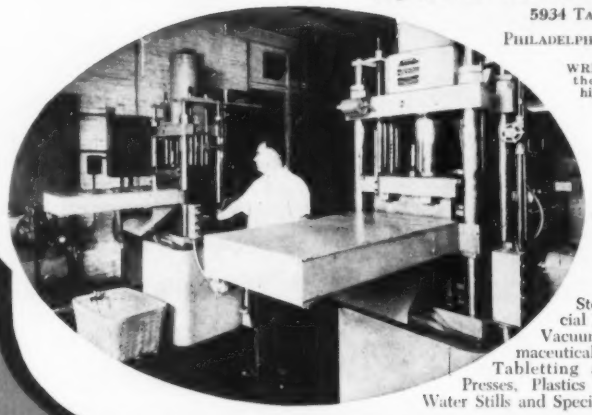
WRITE for Bulletin No. 741 describing the Stokes Completely Automatic high-production Molding Press.



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RX 400 is a series of economically-priced medium-high impact thermosetting phenolic molding materials just announced by Rogers Corporation. These new compounds combine the advantages of strength with good preformability and excellent finish. They are dustless, fast-curing and may be molded in the same molds used for general purpose compounds.

Already in wide use for numerous large applications, Rogers RX 400 materials speed production of high strength components. Special formulations and colors are available. Write now for full details and samples.

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Tetrahydrofurfuryl Oleate

RESISTS OXIDATION

EMERY'S PLASTOLEIN 9250 AGES WITHOUT DEVELOPING RANCIDITY!

Avoid the odors associated with THFO plasticized films. Use Emery's Plastolein 9250 especially formulated to resist oxidation and rancidity.

Improves drape, aids in internal lubrication, adds light and heat stability all at lower cost.

Recommended for its money saving value as a secondary plasticizer. Plastolein 9250 improves performance of primary plasticizers. Write for samples or technical data on Emery's improved tetrahydrofurfuryl oleate.

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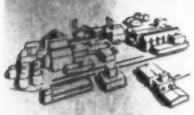
Emery also manufactures a group of primary plasticizers for the vinyls: coated fabrics, unsupported film, extrusion and moulding compounds. Recommended also for Organosols and Plastisols.

Designed to promote low-temperature flexibility, these plasticizers have low volatility, high water and oil resistance. Plasticized films are clear, free from haze and possess excellent tear strength. Write Plastolein department for specific recommendations for your use.



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MODERN PLASTICS

babies—
a continuing market for plastics

COURTESY CELANESE CORP. OF AMERICA

Safety crib guard is of cellulose acetate; top crib rail is covered with ethyl cellulose or acetate

BY the end of 1949 the infant population of the United States (babies under three years) will have reached a high of 10,300,000, according to the Metropolitan Life Insurance Co. The infant accessories market is huge and constant, with 200,000 new babies born each month. How plastics have expanded their position in this field will be seen in this survey of representative examples of applications in the infant market. It is impossible to include here a complete description of all the ways in which plastics have entered the nursery. However, the items described show how plastics have improved a number of different lines or have found application where only their particular properties have made a given job possible.

The use of plastics in the infant accessories market is not new. As far back as 30 years ago, the I. B. Kleinert Rubber Co., New York, N. Y., introduced a nitrocellulose-coated silk protective baby panty to provide the public with a free-from-rubber panty. It weighed less than an ounce, and because it had more "body" was less inclined to cling to the diaper than did the rubber garment. The fabric coating and assembly were done by Kleinert, who adopted the trade name Softex for this line.

Shortly after World War II, Kleinert introduced vinyl-coated silk, nylon, and rayon panties in its Softex line. These retail at about $1.00, $1.00 and $.79, respectively. Coming along about this time, too, was its all-vinyl film panty, with a gum rubber band around the leg and top openings, which sell for about 50¢ each. The company uses mostly 4-gage Vinylite film.

Ingenuity in styling pays dividends even in babies'

Nursing bottle of extruded polyethylene is sterile, unbreakable, disposable, and leakproof. Unit also has disposable polyethylene film nipple protectors

COURTESY SHELLMAR PRODUCTS CORP.

COURTESY MONSANTO CHEMICAL CO.

Two-handled mug molded of polystyrene, designed to aid in balancing drink, will not chip and cannot be chewed

COURTESY FIRESTONE PLASTICS CO.

Matched print vinyl film is used for bassinet pad, lining, and skirt; high chair and play pen pads; bib; crib headboard, bumper, mattress cover, and quilt; diaper bag; hassock and drapes

Base and heating element cover of bottle sterilizer are molded of phenolic to provide immunity to boiling water and self-insulation against heat and electricity

COURTESY DUREZ PLASTICS & CHEMICALS, INC.

protective panties, and many firms have come out with "glamour pants" made of rayon, silk, nylon, etc., with fancy bows and grip fasteners and lined with thin-gage vinyl film. Among these are a lace trimmed rayon jersey panty manufactured by the Archer Rubber Co., Milford, Mass., with the plastic lining cut from Geon vinyl film, and a nylon panty with 4-gage Vinylite lining manufactured by Alexis, Inc., Atlanta, Ga.

Another type of panty for keeping baby socially acceptable is a plastic-coated diaper pad with an insert for disposable or regular diapers. One of the newest models of this type utilizes a snap closing at the waist, eliminating the use of pins, and is manufactured by the Transparent Cover Co., Inc., Chicago, Ill.

Especially designed to be made from vinyl film is a new line of toddlers' outer garments with the protection "built right in." One of the first manufacturers of knitted creepers to incorporate plastic in its plans was the Miller Art Mfg. Co., New York, N. Y., which has been in that business for 25 years and which this year used the plastic liner in its complete line of creepers. This company is using 4-gage film which is stitched to the inside of the cotton knit garment.

COLOR PLATES COURTESY BAKELITE CORP.

Upholstered headboard and bumper of quilted vinyl is easily washed—protects baby from drafts and bruises

An eyelet trimmed seersucker sunsuit with 4-gage vinyl lining, manufactured by Alexis, Inc., Atlanta, Ga., is suggested as the minimum wear together with a diaper, for an infant on a hot day. One of the newest "water-proofed" infant garments is a corduroy overall recently put on the market by Alexis which has a vinyl film panty with snap openings down each side sewed to the inside waistbands to cover only the diaper.

Vinyl film (mostly 4-gage) aprons and bibs for tots are being marketed in a great variety of styles and appropriate film designs to keep the baby clean and dry. One style made by Kleinert uses terry cloth sewed to a 4-gage vinyl film backing which helps to prevent water or other liquid from running down into baby's lap. The terry cloth absorbs the liquid while the plastic backing keeps the baby's clothing dry.

Sleeping comfort

Not only is today's baby prettily and practically clothed in plastics, but he is literally surrounded by plastics as he sleeps, eats, and plays. The applications which contribute to sleeping comfort are, like the clothing already described, largely dependent upon strong, wear resistant, water proof vinyl. Thus, a complete line of nursery bedded goods and nursery pads is now being manufactured by many firms, using vinyl film or vinyl-coated fabric. For hygienic sleeping comfort, the baby's crib mattress is covered with vinyl film or vinyl-coated fabric. Because the ticking material must be strong enough to stand the wear and tear of a baby's bouncing body for a considerable length of time, one large manufacturer of crib mattresses has stated that nothing lighter than 8-gage vinyl film will serve the purpose. This firm, Rose-Derry Co., Newton, Mass., manufactures its line of Kantwet crib mattresses with both Vinylite film and Vinylite coated fabric tickings.

Rubber foam mattresses manufactured by Allatex Foam Rubber Products Co., New York, N. Y., are furnished with a zipper removable Wataseal vinyl film mattress cover.

Separate crib mattress covers in vinyl film, generally 4-gage, are on the market to give waterproof protection to other types of mattress ticking. One such mattress cover is made by the Enduro-Tex Div., Seal Sac, Inc., New York, N. Y., which uses Koroseal vinyl film. The cover has a generous gusset and a wide zipper opening.

Crib sheets of 4-gage vinyl film with eyelets on each corner to tie on to the crib are more stain resistant and generally less expensive than rubber sheeting.

Upholstered headboards with bumper guards made of 4-gage vinyl film, quilted or plain, adorn the baby's crib to protect him from bumps and drafts.

The baby's basket, or bassinet, is lined with 4-gage vinyl film quilted to cotton wadding, as is the basket pad; and vinyl film in a lacy or marquisette pattern makes an attractive basket skirt. Basket linings in many different styles are featured by manufacturers of bedded goods, including Bancroft-Rellim Corp., Boston, Mass., which uses Firestone vinyl film and reports consumption of 1½ million yd. a year in the manufacture of its basket linings and skirts, headboards and bumpers, high chair pads, play pen pads, and carriage pads.

Most nursery bedded goods and pads are made in either quilted or plain vinyl, or both, such as the Vinylite basket pad made by Kleinert, which is plain on one side for waterproofness and quilted on the other side for effect. Sewn quilted vinyl is bound to

COLOR PLATES COURTESY BAKELITE CORP.

Baby bath made entirely of vinyl, except for wooden frame, is strong and easily cleaned. The tub is formed from a single sheet of film, eliminating wrinkles and folded corners which could collect dirt and soap

be less waterproof because of the tiny holes made by the needle; however, there seems to be good acceptance of the quilted goods by customers.

Although there are no figures available on the extent to which vinyl film has displaced the use of other materials in this line—i.e., plain or quilted cotton, rubber or rubberized fabric, and nitrocellulose coated fabric—its many advantages make it a serious competitive threat. It can be washed by wiping with a cloth dipped in lukewarm water and mild soap suds without removing it from its place in the nursery; its waterproofness, resistance to stain, fading, and mildew, flame retardance, noncracking and non-peeling characteristics, make it a "natural" for a more hygienic nursery. Nor is glamour lacking, as is illustrated by a line of matching plastic accessories for the nursery shown in the Baby Shop of Lane Bryant, New York, N. Y. These include a plastic high chair pad, plastic tie-on bumper for the crib, plastic wood-fiber filled rug for the play pen, and plastic draperies, all made with vinyl film in a matching rocking horse print. The items were all manufactured by the Alexander Miner Mfg. Corp., New York, N. Y., of 4-gage Koroseal and tagged with the trade name "Minerline."

Added accessories for the crib include a teething aid in the form of an extruded strip of cellulose acetate or ethyl cellulose U-shaped in cross section and designed to snap over the top rail of the crib. A baby can chew his way up and down its entire length with no danger of chipped paint or splintering wood. Safety crib guards of cellulose acetate covered wood, with chrome metal attachments, may be attached to the top crib rail to discourage climbing and resultant falls. Both these products are manufactured by R. Barbara Blanke Creations, New York, N. Y., and Nursery Plastics, Inc., New York, N. Y., using Lumarith, Tenite I, or Ethocel.

Decorative effect in the nursery is supplied by washable plastic wall plaques in the shape of story book characters. Some of these glow in the dark, such as the animals molded from Lustrex or Styron luminescent polystyrene by Agate Plastics Corp., Chicago, Ill. Coat hangers are molded especially for the tot's clothes in light-weight plastic by many manufacturers, including Gemloid Corp., Elmhurst, N. Y., from Lustrex; Commonwealth Plastics, Inc., Leominster, Mass., from Styron; and Caldwell Products, Inc., Bronx, N. Y., from Styron. Nursery lamps, all or partially made from plastics, are a joy to the mother since they are light in weight, smooth, colorful, and practically unbreakable. One of these, made of Koppers polystyrene by All Plastics Corp., Avon-by-the-Sea, N. J., is shaped like a lighthouse.

Feeding time

For the high chair crowd, gaily colored dishes of plastic make eating time more appealing. Especially

designed to meet the needs of the child just learning to eat by himself is Scoop Dish, manufactured by Givens & Co., Clarendon Hills, Ill., and compression molded of Melmac melamine plastic by Imperial Molded Products Corp., Chicago, Ill. (See MODERN PLASTICS, Oct. 1949, page 92.) The dish, which has undercut food cavities at the front to prevent slopping, is unbreakable and may be boiled indefinitely. Supplied with this dish is a Scoopy spoon with a melamine handle designed to conform with the young child's wrist action.

A "Bunny Bear" feeding dish with two separate cavities and shaped with a bunny head and tail is molded of Styron or Lustrex by Bunny Products, Inc., Minneapolis, Minn. A two-handled mug designed to help baby balance his drinking is manufactured of Lustrex polystyrene by Kayware Corp., Chicago, Ill.

A baby bottle sterilizer with a Durez phenolic base and heating element cover is molded by Michigan Molded Plastics, Inc., Dexter, Mich., for Electric Steam Radiator Corp., Paris, Ky.

Boilable nylon finds favor with mothers of young children, who use tumblers such as those manufactured of this material by DuBois Plastics, Buffalo, N. Y.; nursing bottle funnels of non-toxic, flexible, and shatter-resistant nylon, such as those manufactured by Terr Industries Co., Cleveland, Ohio; and nylon bristled brushes for cleaning nursing bottles and nipples. Manufacturers of these brushes include Kellogg Brush Mfg. Co., Westfield, Mass.

Disposable nursing bottles which are sterile, unbreakable, and leakproof, manufactured from polyethylene layflat tubing by Shellmar Products Corp., Mount Vernon, Ohio, were described in MODERN PLASTICS, Nov. 1948, page 90. Obviating the necessity for washing and sterilizing bottles, this product, called the Shellie Nurser, is now equipped with disposable polyethylene film nipple protectors.

Removable high chair pads of 4-gage vinyl film over cotton wadding keep the baby more comfortable and help to keep the chair cleaner. Also on the market are high chairs with plastic upholstery built in, including those manufactured by Bilt Rite Baby Carriage Co., Inc., and Wear Ever Baby Carriage Co., Inc., both of Brooklyn, N. Y. Both firms use 12-gage Duran vinyl film.

Bathing the baby

Plastics are very much in the picture when it is baby's bath time. A baby bath designed and fabricated by the Hedwin Corp., Baltimore, Md., is made entirely of plastic except for the wooden frame. The table top, made of 12-gage Vinylite film, does not sag or droop from extended usage and will even hold the weight of a 200 lb. man, according to the manufacturer. The tub itself is fabricated from a single sheet of 40-gage film which when formed goes down to about 20-gage. All wrinkles and folded corners which could collect soap or dirt are thus eliminated. The drain fitting at the bottom of the tub is heat-sealed to the plastic, and the drain tube is of non-kinking plastic with a simplified hook end for easy and safe draining. This baby bath sells for considerably less than most metal frame baths and at a price competitive with other wooden frame models.

Another baby bath, called the Kiddie-Bath, utilizing 8-gage Vinylite film for all pockets and the tub rest, is manufactured by Trimble, Inc., Rocheter, N. Y. The table top is fabricated from 16-gage film. Both these baths have been on the market a com-

Waterproof panty of rayon jersey lined with vinyl may be had in pink and white for girls, blue and white for boys

COURTESY B. F. GOODRICH CHEMICAL CO.

Formula bag made with vinyl coated fabric has glass fiber interlining to keep bottles at proper feeding temperature

COURTESY NAPPE-SMITH MFG. CO.

paratively short time but are finding exceptionally fine public acceptance, according to the manufacturers. An added advantage of vinyl film and sheeting in these and other nursery applications is the fact that the plastic material is available in a wide range of colors. The traditional baby blue and pink, forming an integral part of nursery color schemes, provides powerful buyer-appeal.

A bathinette pad of 4-gage vinyl film quilted to cotton wadding for the baby bath top is selling very well. Previously used, of course, were towels, cotton pads, etc., which must all be washed and hung to dry, whereas the plastic pad may be merely wiped off with a damp cloth.

A sturdy support made of cellulose acetate is designed to keep a soapy wiggling baby from falling while in the bathtub. One such device, called Baby Moor, consists of a plastic back-and-sides section, semi-circular in shape, and two strips of webbing which fasten across the baby's stomach and under his bottom. Four rubber suction cups secure the Baby Moor to the tub. Wide open spaces in the support allow ample access for washing the baby. The Baby Moor is manufactured by Bunny Bear, Inc., Everett, Mass., and molded of Tenite by Dapol Plastics, Inc., Worcester, Mass. The plastic is smooth surfaced and pleasantly warm to a baby's sensitive skin.

Training seats and nursery chair manufacturers are utilizing plastics to an increasingly larger degree. The seat, tray, and chamber of a nursery chair manufactured by The Lobdell-Emery Mfg. Co., Alma, Mich., are molded of Tenite cellulose acetate by Michigan Plastic Products, Inc., Grand Haven, Mich. One-piece construction of each Tenite part eliminates cracks or crevices which might harbor germs and dirt.

Training seats built for comfort and safety in peel-proof plastic are more hygienic than conventional wooden seats. Included among the manufacturers of these items is Thayer Inc., Gardner, Mass., whose training seat is molded in one piece by Victory Plastics Co., Hudson, Mass., of Tenite II cellulose acetate butyrate. The unit has an adjustable strap and removable footrest to keep the child secure.

A combined primary and secondary seat in one trainer is manufactured by Duke Mfg. Co., Newark,

COURTESY HERCULES POWDER CO.

Adapter of ethyl cellulose, in many colors, fits any standard toilet seat

Seat, hinged arms, and back of cellulose acetate adapter fold for compact storage

COURTESY CELANESE CORP. OF AMERICA

Double function is performed by combined primary and secondary trainer molded of cellulose acetate

COURTESY TENNESSEE EASTMAN CORP.

One-piece construction of cellulose acetate seat, tray, and chamber eliminates germ-harboring cracks

COURTESY BAKELITE CO.

Seersucker sun suit with eyelet trimming has lining of 4-gage vinyl. Garment, designed to offer minimum coverage in summer, eliminates wrinkles and bunching

COURTESY KOPPERS CO., INC.

Softly glowing night lamp, molded of polystyrene, is shaped like a lighthouse—provides decorative effect

N. J., of Lumarith cellulose acetate. Manufactured by Abell Chair and Novelty Mfg. Co., Inc., Brooklyn, N. Y., is another well-designed child's adapter with seat, arms, and back molded of Ampacet cellulose acetate.

Traveling with baby

Various plastics accessories make traveling with the baby more convenient. A vinyl inflatable tub serves as a bathtub for the baby when away from home or, when placed with the flat side up, as a small mattress. It deflates to a small package and weighs only one pound. One such tub is made of 12-gage Vinylite film by Kleinert, who markets it under the name Rub-A-Dub-Tub.

The always necessary diaper and traveling bags are being made more practical and more glamorous with the aid of vinyl film. The film does not peel or crack as was sometimes the case with previously used materials; it has no odor when wet and is easier to keep clean. One such diaper bag, manufactured by Nurserie Items, Inc., New York, N. Y., and utilizing Prestoflex 4-gage vinyl film, is double quilted; that is, the quilting is on both the inside and outside. Two straps of 20-gage film are attached to the inside of the bag to hold bottles, and an inside bag of 4-gage film is provided for soiled diapers.

Several styles manufactured by Alexander Miner Mfg. Co. of Goodyear vinyl film include a carriage bag in nursery colors with 4-gage quilted film on the outside and a 4-gage opaque interlining; a heavier 20-gage film style in darker colors resembles a lady's handbag and is lined with 4-gage vinyl film.

Insulated food bags made from vinyl film and lined with Fiberglas for insulation maintain correct feeding temperature for baby's bottles for at least 4 hr. and will keep the bottle contents cold, when desired, for an even longer period. They are suggested for traveling or may be kept handy at the bedside for baby's two o'clock feeding. Several styles manufactured by Nappe-Smith Mfg. Co., Farmingdale N. J., include a Thermo-Keep four- and two-bottle size Formula Bag, both of which are made with vinyl coated fabric with a Fiberglas interlining and an inside lining of 4-gage vinyl film. A single-bottle zippered container manufactured by Nurserie Items, Inc., utilizes 4-gage quilted Prestoflex vinyl film with an interlining of Fiberglas and an inside lining of 4-gage Prestoflex.

Another type bottle holder recommended for use while traveling with the baby is manufactured by Sani-Therm Corp., New York, N. Y., and molded of Celcon ethyl cellulose by Arnold Brilhart, Ltd., Mineola, N. Y. The container can be sterilized for 2 min. in water of 180° or washed in water of 110°. The bottle fits snugly into the container, which protects it from breaking, cracking, or chipping.

What buyers want

Improved informative labeling is still demanded by many department store buyers of nursery items, particularly in boilable and unboilable molded items. One buyer suggests that labeling be used not only on the package but also on the item itself.

Eye appeal is, of course, still a big factor in consumer buying, but utility is demanded and can generally be obtained in the same item. Store buyers were frank to state that they were very satisfied with the reactions to the plastics lines they were handling. Some had received legitimate complaints in the past and had merely discontinued buying from that particular supplier since the problem was generally one of inferior manufacture or design or misapplication.

Today's plastics manufacturers, who couple constantly improved ideas in design and application with up-to-date merchandising methods, are assuring plastics' expanding position in the infant market.

Tape Reinforces Vinyl Sheet

COURTESY B. B. CHEMICAL CO.

Above: Reinforcing tape is particularly adaptable to furniture using unsupported vinyl upholstery. Material may be applied to various parts of the chair

COURTESY ADDISON-WADE CO.

Left: Strips of reinforcing tape are applied to chair seams. Patches, 2 in. wide, are also used in areas where deep tufting may cause stress to develop

Below: Tape dispenser has knurled roll immersed in solvent to activate underside of material. Cutting is done with shear knife

COURTESY B. B. CHEMICAL CO.

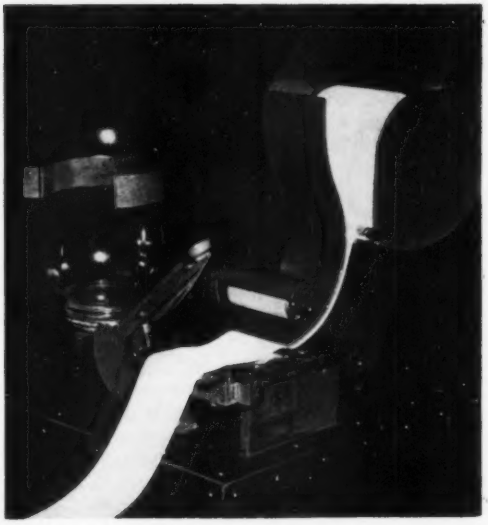
A TAPE for reinforcing stress points in unsupported vinyl sheeting used in the furniture industry has been developed by B. B. Chemical Co., Cambridge, Mass. The new product, called Bostape, consists of a cotton fabric coated with a wet-back adhesive. It is used to reinforce sewed seams, areas in which square or angular cuts are to be made, and areas subjected to the stress of deep tufting.

Bostape is sold in three widths—1, 2, and 4 in.—and is applied to the underside of the vinyl sheet by moistening with solvent and pressing with a seam roller. The adhesive used is claimed to give a permanent, non-staining bond. The manufacturer has also developed a dispenser which applies activator to the under side of the tape.

The cost of using Bostape is said to be between ½ and 1% of the manufacturer's selling price for a piece of furniture. The Bostape required for a $35 chair, for example, will cost 15 to 25¢, including the activator and the cost of applying the tape. This small investment protects the manufacturer against a possible loss of $20 or $25 if the vinyl cover tears and the chair is returned for repair.

The manufacturer states that Bostape has been adopted by almost 200 furniture manufacturers since its introduction early in 1949. It is also being distributed to the reupholstering trade.

Another development is Bostape #2, which is coated on both sides and can be used to bond two pieces of vinyl sheeting together or to bond vinyl to wood, plaster, metal, glass, or other surfaces. Bostape can also be used to repair vinyl inflatables.



Miniature candy bar bank, injection molded of polystyrene, is attractively packaged in colorful folding box. Included in the container is a carton of 24 bank size bars. Refills are available at 19¢, netting children a 5¢ profit each time two dozen bars are "sold"

Candy Bank Pays a Profit

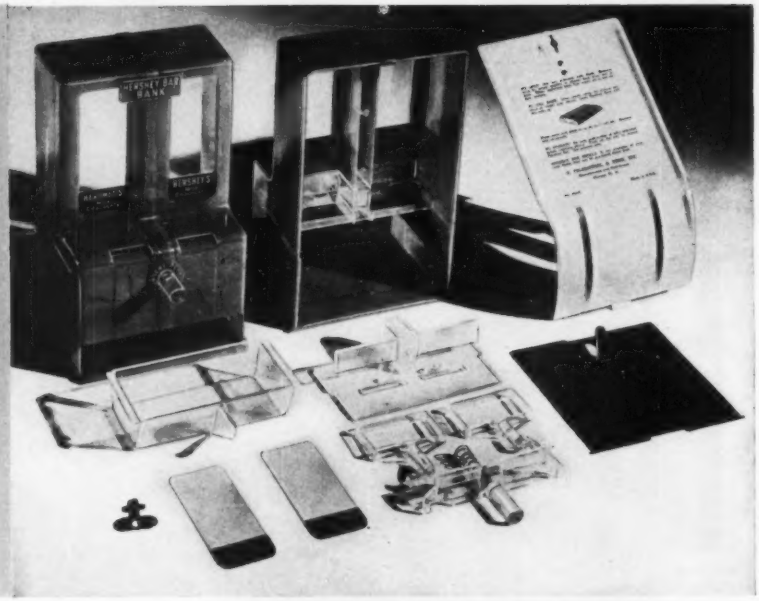
Miniature coin operated vending machine, filled with items of Hershey bars, has many merchandising appeals

TOY and candy sections of leading department stores from coast to coast are now featuring a new plastic novelty item that combines attractive design and sturdy construction with play and educational appeal, plus the added merchandising magic of one of the best known names in the candy field. It is the Hershey Bar Bank—a diminutive vending machine which "sells" penny-size Hershey milk chocolate bars and pays Junior a dividend in extra coins each time the machine is emptied.

Standing just over 6 in. high, the bank was specially designed to hold 24 of the miniature Hershey bars, which are available elsewhere only from standard vending machines in New York, Chicago, and Philadelphia elevated and subway stations. Originated by G. Felsenthal & Sons, Inc., Chicago, Ill., the bank is now being molded and assembled by that company at the rate of more than 6000 units daily.

Conceived by Nathaniel C. Ratner, manager of Felsenthal's New York office, the bank, whose modern styling closely resembles that of the latest full-scale vending units, has two coin slots. It carries a dozen 1¢ Hershey bars in each of two columns, clearly visible behind clear sheet polystyrene windows. To operate the toy, a penny is dropped into one of the slots and the plunger projecting from the front of the machine is pressed. This releases a Hershey bar from the bottom of the device and drops the coin into a drawer which can be removed from the rear of the bank when the back is taken off.

The bank not only provides the child with a clean, home-supervised source of wholesome candy, but also helps him to understand the value of money and encourages saving. When the original supply of chocolates is exhausted, specially packaged 24-bar Hershey refills are available for about 19¢ at stores



Front and rear views of housing with back removed. In the center foreground are the clear, transparent polystyrene working parts of the vending assembly. At the left are the money drawer and sheet polystyrene windows

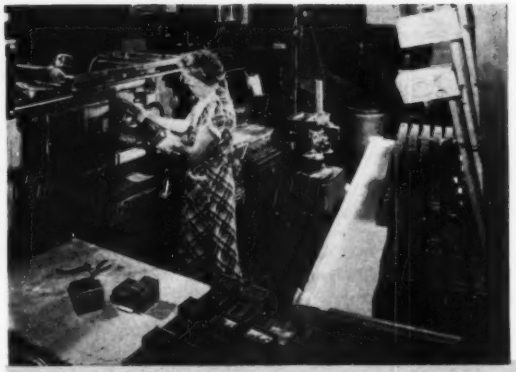
selling the banks. Thus, the young banker enjoys a "profit" of 5¢ each time Mother unlocks the bank and removes the money. The bank itself, complete with 24 bars, is fair traded at a minimum price of $1.95 retail.

Molded and fabricated

All plastic parts of the Hershey Bar Bank are injection molded of Monsanto Lustrex polystyrene except the windows, which are cut from Plax Corp.'s Polyflex styrene sheet. The housing is molded in "toy red," while the interior working parts are of clear transparent material. One die produces two housings; a second, with 12 cavities, makes two complete sets of the transparent parts. Both shots are run on 8-oz. Reed-Prentice presses.

The coin-operated mechanism includes two sliding rectangular enclosures positioned just above a supporting shelf. The bottom chocolate bar in each column rests within these enclosures. The plunger unit does not engage the vending mechanism unless a penny is dropped in the slot.

When a coin is deposited in the bank, it is held upright in an internal slot, completing the mechanical contact between the moving parts and causing the bar enclosure to move back when the plunger is pressed in. Reaching the edge of the supporting shelf, the bottom bar falls free and slides out the delivery opening of the bank via the curved back, while the coin drops through another slot into the money drawer. A compression spring on the plunger assembly then returns the mechanism to its original



Housings are produced in two-cavity mold on 8-oz. injection press. After degating, pieces are placed on shrink blocks

position and another bar settles into vending position.

The selection of polystyrene for the plastic parts of the bank was based on its non-toxic properties, color range, dimensional stability, light weight, and economy. The functional components of the vending unit must maintain their dimensions within close limitations if the device is to operate properly.

Assembly line perfected

In setting up for an output of approximately 36,000 banks per six-day week, Felsenthal devised an efficient assembly-line technique. All final as-

sembly operations, such as cementing the operating mechanism into position in the housing, installing the windows in the front of the bank, etc., are performed in duplicate, with identical stations along both sides of the line. Moving belts carry the banks along the table between the various assembly operations and on to final packaging. There are also some sub-assembly cementing operations before certain transparent parts reach the final assembly line.

Felsenthal does its own fabricating on the sheet metal components of the bank, including the lithographed back, the snap-in partition which holds the bars in position, and the lock and key. The lock engages a slot milled inside the top of the plastic housing, while the partition hinges on small projections which pass through openings drilled in the side walls of the bank.

Special jigs used

The clear polystyrene window material is printed in large sheets in silver and brown, and the sheets are then cut in multiples to form the windows of the vending machine. Specially designed jigs, fixtures, and revolving tables are used to speed drilling, milling, cementing, and assembly operations. The toy name and instructions molded in relief on the front of the housing are roller-coated in silver for added contrast. To save time, the press operator running the housings also mills the bottom slot into which the tab of the metal back is inserted; this is done directly at the press before the housings are degated and placed on cooling fixtures.

Racks speed parts handling

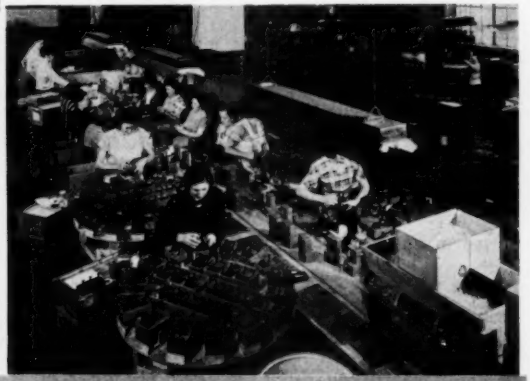
One of the most important production aids utilized on this job by Felsenthal is a special type of rack holding an entire shift's production of bank housings. The racks have removable shelves which are hinged on one side and can be swung up out of the way when not in use. After filling the lower shelf, the press operator lets down each succeeding shelf until all are loaded, at which time the entire rack is wheeled to the elevator and taken to the finishing department. This type of rack, adaptable to many molded parts, saves time and labor, eliminating the necessity of carrying the housings about the plant in tote boxes.

At the end of the assembly line, the key is fastened to the finished bank with cellulose tape and the toys are packed in attractive folding cartons. The package design, which includes colored illustrations of the bank, was developed in cooperation with Ace Carton Corp., Chicago, Ill. Also placed in this carton is a special box of two dozen miniature Hershey bars to fill the machine. Three dozen or four dozen banks are packed in two sizes of corrugated shipping containers when they reach the end of the assembly line.

Production and distribution of the Hershey Bar Bank are handled exclusively by Felsenthal. Due to production limitations, initial distribution is limited to about 500 leading department stores and a few specialty shops. However, it is planned to make the bank available to chain drug and variety stores after the first of the year.

To gain adequate drying time, parts of vending mechanism, cemented with carbon tetrachloride, are packed down long tables

Conveyor belt traveling down center of table, with duplicate operations on either side, speeds up final assembly of candy banks



Housings are temporarily placed on revolving tables after vending units have been cemented. Banks are packed at opposite end

New England S.P.I. Conference

ON THE summit of Mount Equinox, 4000 feet above surrounding Vermont, the New England Section of the Society of the Plastics Industry opened its fifth annual conference on Oct. 13. For the initial session, Dr. J. D. Davidson, president of Carbide & Carbon Chemicals Corp., opened the first wing of his Sky Line Inn, a building in which the floors, walls, wiring, table surfaces, furnishings, and other decorative details are all made from, or treated with, plastics.

At the opening session Dr. Davidson presided, introduced by W. B. Wallace, Mack Molding Co.

Guests were The Hon. O. L. Patteson, governor of West Virginia and The Hon. Ernest W. Gibson, governor of Vermont. J. R. Price, division manager, Vinylite Film and Sheet Div., Bakelite Corp., described to the delegates the various uses of plastics in the mountain top inn.

The annual dinner meeting, held in the dining room of The Equinox House at Manchester, was under the chairmanship of Horace Gooch, president of S.P.I. Featured speaker was Orlo M. Brees, New York State Legislature. Amos L. Ruddock, Plastics Div., The Dow Chemical Co. and chairman of the S.P.I. Informative Labeling Committee's subcommittee on promotion, presented the committee's program for the extension of educational work to molders, fabricators, and the distributive trades.

The formal session of the conference was on Friday, Oct. 14, and was presided over by George V. Sammet, Jr., Northern Industrial Chemical Co., and chairman of the Boston-Providence Chapter of S.P.I.

The molding of Polythene was discussed by K. J. Persak, Technical Service Div., E. I. du Pont de Nemours & Co., Inc. The low bulk factor of Polythene molding material, its wide molding range, and its freedom from plasticizer problems were stressed. The speaker emphasized that control of injection cylinder temperatures, injection pressure, and mold temperature is imperative; that molds must be cored for fluid circulation; that molds must be constructed to minimize flash; and that cavities should be adequately vented.

E. C. Van Buskirk, U. S. Rubber Co., spoke on applications and methods of fabricating Royalite, his company's styrene-acrylonitrile-butadiene copolymer sheet material. He stressed that this compound, part plastic and part elastomer, may be varied in physical properties by shifting the ratios of the copolymers and by adding various quantities of both pigments and modifiers. He described the preparation of the basic compound and the sheet material and the accepted methods of forming it.

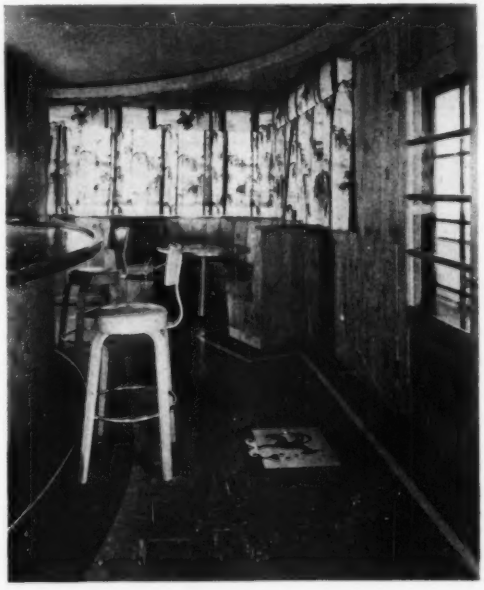
"The Supplier Looks at the Molder Three Years After" was the subject of an address by James R. Turnbull, general manager of sales, Monsanto Chemical Co. With due appreciation for the progress that has been made in molding technology and in merchandising of molded products in the past three years, Mr. Turnbull exposed a few important weaknesses in the present picture and outlined volume targets the industry might hope to attain in the reasonably near future. Among the mistakes being made by some molders at present are the copying of designs and ideas of other molders, the production of goods of insufficient strength and quality in order to meet price pressure, and the lack of attention to balance of interest in markets under development.

Chairman elected

At the section's annual business meeting Sherwood L. Young, vice-president of C. F. Church Mfg. Co., was elected chairman of the New England Section for the 1949-1950 term. Chapter chairmen under the section are George V. Sammet, Jr., heading the Boston-Providence Chapter; George Carlson, Arrow, Hart & Hegeman Electric Co., heading the Western New England Chapter; and A. R. MacIntyre, Reed-Prentice Corp., heading the Worcester-Leominster Chapter.

Sky Line Inn, scene of opening session of S.P.I. Conference, features plastics in floors, drapes, walls, etc.

COURTESY BAKELITE CORP.



No. 6 of a series on vinyl film, sheet, and coatings

Full-color rotogravure brings to vinyl film some of the finest printing available today. This marine pattern was gravure printed by Susquenhanna Plastics, Inc.

Gravure Printing on Vinyl Film

Some of the problems involved and some of the improvements needed in machinery, inks, and techniques

by MARC A. CHAVANNES

TOTAL daily production of vinyl film for civilian uses has soared from a mere 10,000 yd. on V-J Day to more than 1½ million yd. today. The remarkable characteristics of the vinyls are, of course, the basis of such a spectacular success. The fact that vinyl films are waterproof, grease-proof, and spot-proof, and that neither mildew nor fungi nor moth can attack them, has played a great part in their success. They are also inexpensive and were favored from the start by the relatively high prices of fabrics and by the shortcomings of more closely competitive articles such as oilcloth and pyroxylin coated textiles. The added fact that vinyl films can be beautifully decorated is, however, also largely responsible for their ready acceptance by the public.

MARC A. CHAVANNES, author of the accompanying article, was born in Switzerland. A graduate of the University of Lausanne, he has been a pioneer in the latex and plastics fields. Many of his discoveries have been exploited in Europe. He came to the United States in 1939 and has been vice-president of Plastic Film Corp. and of Susquehanna Plastics, Inc. Today he is president of Chavannes Industrial Synthetics, Inc., New York, N. Y. Millions of yards of vinyl films are printed every month under his licenses.

Sadly enough, many of the first films produced gave a black eye to the new industry. Their odor was terrible. The plasticizer, mostly responsible for this odor, evaporated so fast that the films stiffened in a few months. The first printed goods "crocked" so badly that not only could dirt be cleaned from the film with a wet cloth, as advertised, but the printed design would frequently be removed in the cleaning process!

Background of fabric printing

However, steady improvements were made in the films themselves and in printing. It was soon found that the film sold through the beauty of the designs, perhaps even more than because of the characteristics of the material. Today, about two-thirds of

Oriental motif printed on vinyl film by Harte and Co., Inc., using fabric drum type or intaglio printing machine

the film sold is printed and at this moment more than 75% is printed on "drum-type" fabric printing machines which are descendants of the first contraption which started to run in France two centuries ago. It was in the little town of Jouy-en-Josas in France, on May 1, 1760, that a few hundred yards of cotton were printed in a continuous operation on a one-color rotating printing machine. This device used an engraved cylinder to transfer the ink directly to the fabric, the cylinder being a wooden roller engraved by hand. Thus was produced the first length of the famous *Toile de Jouy* which literally covered the walls of the best houses of Europe in the 19th Century.

It was not until around 1800, however, that copper cylinders started to replace the wooden ones and that the main principles of printing fabrics were established. These principles are, generally speaking, about the same as those used today.

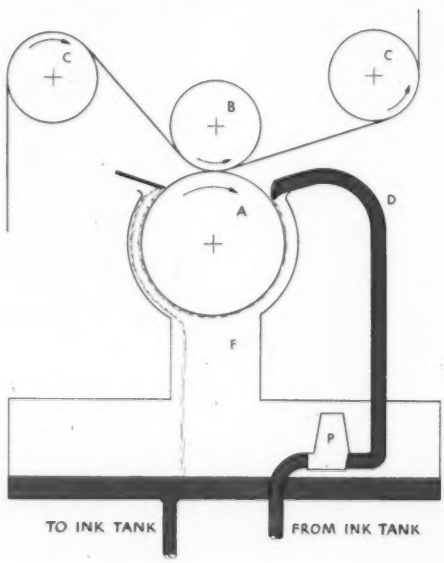
In the drum-type machine, which some call the "intaglio printing machine", the designs are engraved in the copper printing rollers, the engraved parts are filled with ink, and the surface of the printing rollers is wiped clean at every turn by a doctor blade. A furnisher roller transfers the color from the color pan to the engraved cylinders, which transfer it to the material as the machine rotates.

While these machines were not designed for printing on vinyl, they are, nevertheless, doing a fair job. In the change-over from fabric to vinyl film, the machines must be equipped with anti-friction bearings. The frame must be heavy enough to support heavy shafts, especially in machines of big widths. The color doctors must be oscillating so as to avoid streaks and irregular wear of the cylinder. The color pans should be made of a metal neutral to the resins in the inks (Monel, nickel, chrome, or aluminum); otherwise the inks will deteriorate. To feed the film without wrinkles, expanding rollers are indicated, and tension must be constant between the unwind and the drum. It is also preferable to use an endless belt or blanket around the drum, made of a material resistant to the ketones and hydrocarbons used as solvents and diluents for the ink. A blanket stretcher must control the tension in this blanket and the blanket guide roll should be mounted on anti-friction bearings.

Drying the printed film

Two methods are used to dry the printed film. In the first method, the film comes from the printing operation in a loop and goes from the loop into a drier on a carrier belt. In the second method, the endless belt passing around the drum carries the film through the drier. The second method allows the use of higher temperatures during the drying operation. The experienced vinyl printer knows that drying rate governs "crocking" tendencies.

Enclosed fountain for rotogravure printing. Color shows path of ink. *A* is engraved cylinder with doctor blade; *B*, impression cylinder; *C*, idlers; *D*, ink pipe and applicator; *F*, ink return; *P*, pump feeding ink applicator



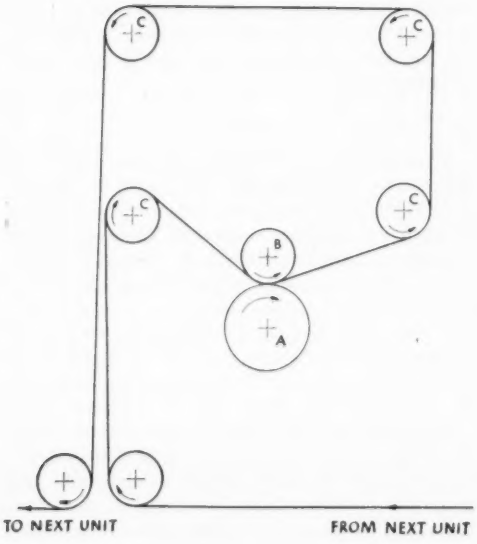
Although the fabric printing machine does a fairly good job in printing vinyls, it is obvious that it was not the best machine for the job. After all, the surface of vinyl film is *the most beautiful surface* to print on. It is a surface much closer to that of a photographic film than to that of a fabric. Of course, since fabric printing machines were available from the start of vinyl printing, since they are relatively low in cost, and since the vinyl products compete with printed fabrics in most of their uses, the converters of film naturally went first to the printers of fabrics. However, the differences between vinyl and fabric surfaces call for differences in printing inks, and the characteristics of the inks govern the conditions of the engraving operation as well as the design of the printing machine itself.

In the fabric printing machine the engraved printing cylinders are disposed around a drum and are driven by that drum through the material to be printed. In the rotogravure machine—most suitable for printing on vinyl film—each engraved cylinder is in a separate unit and each engraved cylinder is individually driven. With the web under uniform tension, registration of the colors can be as close as a few mils, and the distance between the rotogravure units insures complete drying of the inks of each color before the next color is printed.

The right method of maintaining uniform tension of the web between rotogravure units has been a difficult problem. An even more difficult one has been to avoid stretching of the film between the units. These problems have been solved, however, and patents are pending covering the best ways of sticking the film on a rigid support during the printing operation and subsequently stripping the film from its support.

Also printed on vinyl with fabric drum type equipment is this cottage curtain pattern by Velveray Corp.

Diagram of one rotogravure printing unit, showing path of web. *A* is the driven engraved cylinder; *B*, the impression cylinder; *C*, the idler supporting the web. Refer also to diagram of ink fountain on opposite page



Principle of gravure printing

In gravure, lines and tones are broken up into a multitude of tiny cups whose purpose is to hold the very fluid ink and deposit it on the surface to be printed. It is by varying the depth of those tiny cups—and thus the depth of the ink—that variations are made in the intensity or lightness of the colors.

In making a rotogravure printing cylinder, the picture to be reproduced is photographed on a sensitized film, and a positive film is printed from the resulting negative. A fine screen is then printed on a "carbon tissue" by exposure to light. This "carbon tissue" is not a tissue and contains no carbon; it is a sensitized photographic gelatine paper. The positive film is next printed on the screened and sensitized "carbon tissue" which, in turn, is placed around the surface of the cylinder to be engraved, with the image side touching the copper. The cylinder is then soaked in water until the paper backing of the "carbon tissue" can be peeled off, leaving its gelatine coating with its image on the

face of the copper. After drying and after the parts of the cylinder that are not to be engraved have been covered with asphaltum, the cylinder is etched with acid.

During the etching process, the salient points of the lines forming minute squares, having been protected by the acid resist, stand in relief while the surrounding material is eaten away and the cups are thus formed.

Beautiful work can be done by rotogravure. By varying the colors of the inks used, perfect imitations of the best hand-painted fabrics can be made.

Since the etch consists of minute cups varying in depth, it is possible to produce a wide range of tone value from the richest deep color to the purest highlight. Intermediate tones may be produced from as many as 15 different depths of etch on the same cylinder.

A further advantage of rotogravure printing is that a fine screen can be used—for example, 150 lines per inch—which reduces the screen effect. Ink blending from one cup to the adjoining one results in excellent coverage. Recent improvements, such as the fully enclosed ink fountain, prevent evaporation and allow the use of the most volatile inks.

The rotogravure machine

The rotogravure machine also has outstanding advantages of speed, ink economy, and simplicity over the fabric printing machine. An average rotogravure speed of 500 ft. per minute is quite usual; only one-fifth to one-half of the amount of ink is required as is used on fabric printing machines; and the rotogravure machine has no jumble of rollers to be adjusted or washed—the proper supply of ink is automatically provided.

It is, however, by using the "half-tone" process that the most striking results are achieved in printing vinyl film.

In half-tone color printing, the original colored picture is "separated" into its component primary colors by photographing the original design through four light filters. Then four half-tone negatives are made for each color value. By superimposing them, one on the other, a nearly perfect reproduction of the original is produced.

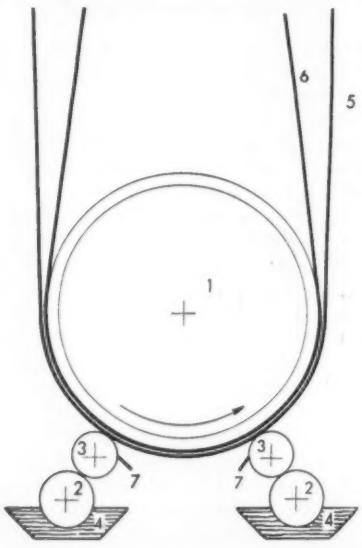
To make a half-tone color reproduction better than "nearly perfect," the final picture is retouched by hand. The shadows are strengthened and something is added by the brush to the vividness of the colors. This retouching concentrates on the main characteristics of the original picture and takes account of the fact that printing softens the tones and loses some of the intensity of the colors.

The beautiful results of the half-tone process are familiar in many posters as well as in the colored sections of many leading magazines. Remarkable reproductions of wood grains, fabrics, leather, or similar surfaces can be made as well as of art-work.

Another printing process is used by firms casting plastic films, which they do mainly out of organosols. This transfer process consists of printing the design on a carrier, then casting the film on the carrier and fusing the ink binders with the plastic itself during the necessary operation of fusion of the film.

Another promising method consists of printing the vinyl inks on a flexible but non-stretchable carrier and then transferring the inks by heat to the preformed film.

Principle of the drum-type fabric or intaglio printing machine. 1 is the rubber covered printing cylinder; 2, furnisher rollers; 3, engraved copper rollers; 4, color pans; 5, film; 6, endless belt; and 7, doctor blades



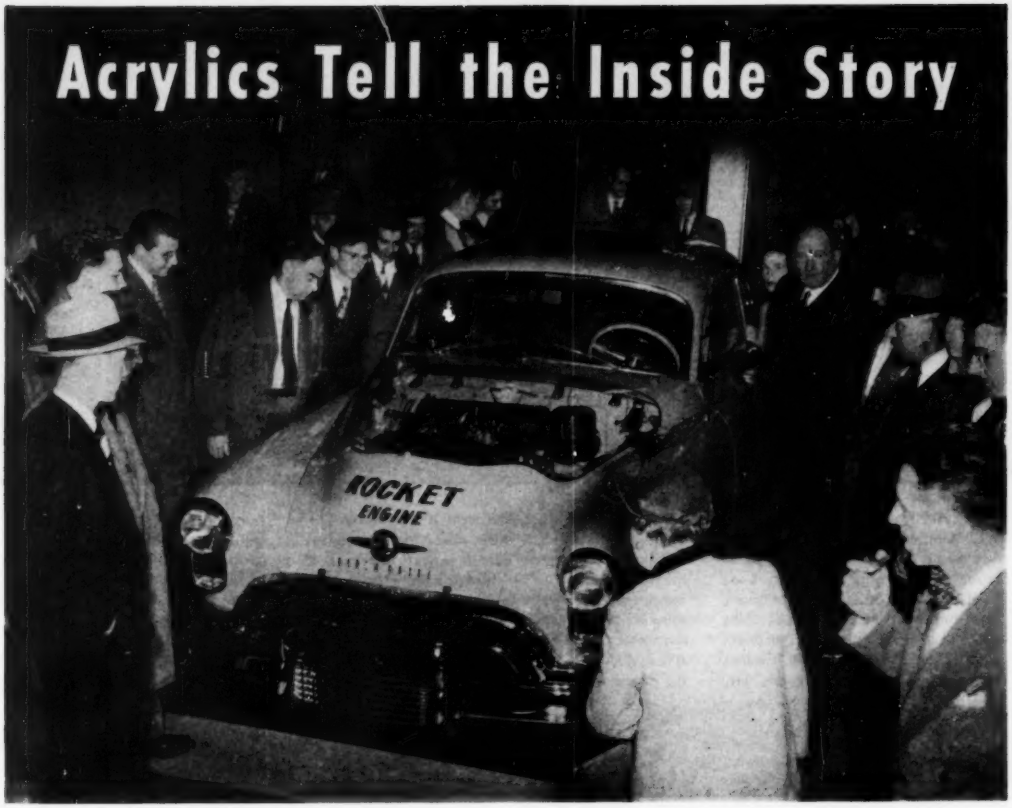
Inks

There is also an interesting development by an able manufacturer of inks who produces an ink of the right nature and viscosity for use on machines designed for printing wallpapers. These wallpaper printing machines are of the drum type and the plastic film can be wrapped around the drum without special support.

In this development of methods of printing on vinyl sheet, due homage must be rendered to the manufacturers of inks. They make their inks with the usual pigments, finely ground and dispersed in a solution containing a binder, generally of a poly-vinyl-chloride type or a copolymer of vinyl chloride and vinyl acetate. Good inks have also been built using the methacrylates. Sometimes plasticizers

(*Please turn to page* 152)

Acrylics Tell the Inside Story



Dramatic sales aid is the transparent acrylic hood used to display the Rocket engine of the 1949 Oldsmobile. Fabricated by Ranger-Tennere, Inc., New York, N. Y., for Plastics Unlimited, Inc., Detroit, Mich., the hoods are sold directly to Oldsmobile dealers and are used for showroom display, special showings, demonstrations, parades, and publicity. By employing the acrylic hood, Oldsmobile is able to show off its new engine without raising the hood and breaking the car's clean, sweeping lines

IN DEMONSTRATING any mechanical device for sales purposes, a transparent working model which can operate with all of its moving parts in full view is the ideal way to answer the oft-asked question: "How does it work?" By giving the perfect answer, such a model can be a powerful selling aid.

The use of clear acrylic to replace opaque materials in certain parts of working demonstrators enables prospective customers to watch the separate parts function in normal position. Thus, they can easily grasp the operating principles involved. The transparent models also make for better selling by acquainting salesmen with the distinctive features of the devices they are to sell.

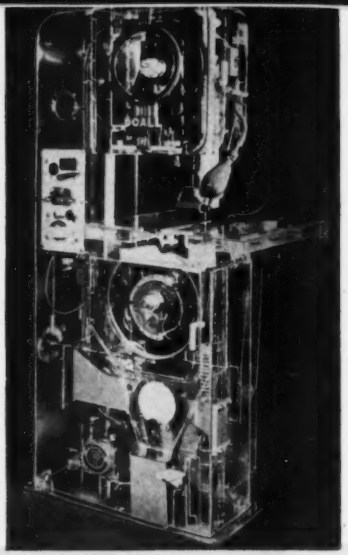
The requirements for transparent models of mechanical devices demand permanent transparency plus ease of machining, ready formability, reasonable strength, and resistance to breakage by impact. Also frequently needed are other special properties, such as high dielectric strength or resistance to chemical action.

Acrylic plastics meet all these stringent requirements. As a result, they have found extensive use in transparent sales demonstrators whose diversity ranges from washing machines to coin-operated lock mechanisms; from contour sawing machines to taxicab meters; from dishwashers to automobile engine hoods; from hand-and-tank type vacuum cleaners to office filing cabinets; from heavy-duty cleaners to refrigerator units; and from inter-communication sets to steak machines.

The most common method of producing acrylic parts is by fabrication. Methods include plug and ring forming, manual stretch forming, ridge forming, and vacuum forming. A variation of the latter is the snapback vacuum process. Here, a male form is lowered into the bubble-formed acrylic sheet. The vacuum is released, and the hot acrylic sheet slowly

Through its transparent acrylic housing, the demonstrator model of General Electric's Heavy-Duty Cleaner, fabricated by Steiner Plastics Mfg. Co., Inc., Long Island City, N. Y., permits a dramatic demonstration of water and suds being sucked up into the container. The cleaner is a wet and dry pick-up machine used mainly in hotels, restaurants, etc.

An innovation in office equipment is the Rock-A-File, whose drawers tilt back when closed. Acrylic windows for the tilting section permit curious customers to see what happens to the filed records when the file compartment is swiveled to a closed position. The filing compartment is manufactured by Charles E. Jones & Associates, Inc., Chicago, Ill., for Rockwell-Barnes Co., Chicago, Ill. Currently being displayed in business shows, the acrylic windows have proven themselves sales-wise

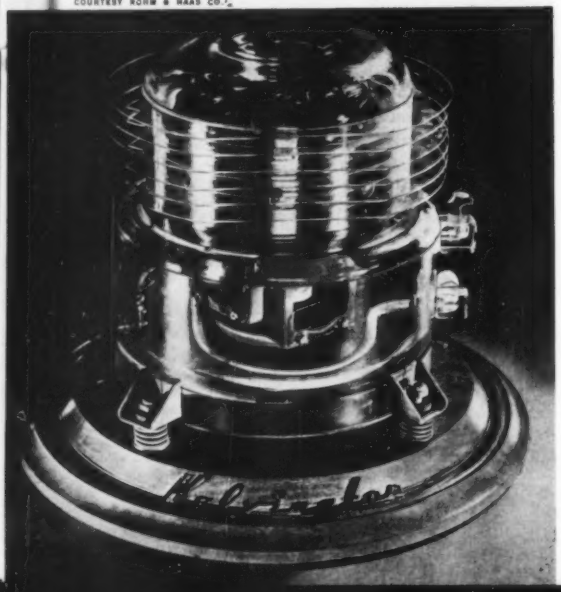


COURTESY ROHM & HAAS CO.

The demonstration model of Do-All contour sawing machines, made by Do-All Co., Des Plaines, Ill., takes advantage of both the transparency and structural strength of acrylic. The transparent housing bears more than 400 lb. of operating parts. The acrylic sheets range from 1/16 to 3/4 in. in thickness in this full scale model

Sales-minded manufacturers who realize how difficult it is to explain to prospective users the operating principles of any mechanical device, are turning more and more to transparent acrylic demonstrators to act as their "silent" salesmen. Acrylic model of the Kelvinator refrigerator motor, made by Benson Products Co., Dearborn, Mich., tells a vivid story

COURTESY ROHM & HAAS CO.

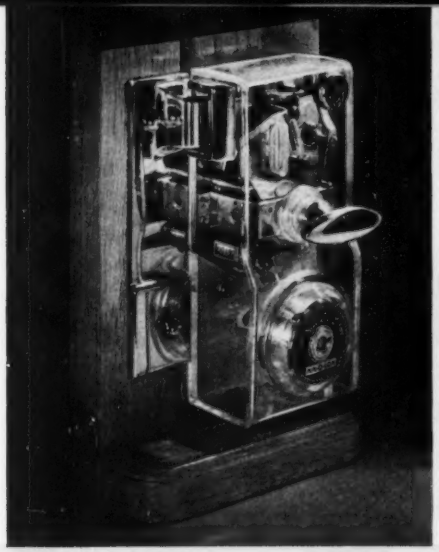


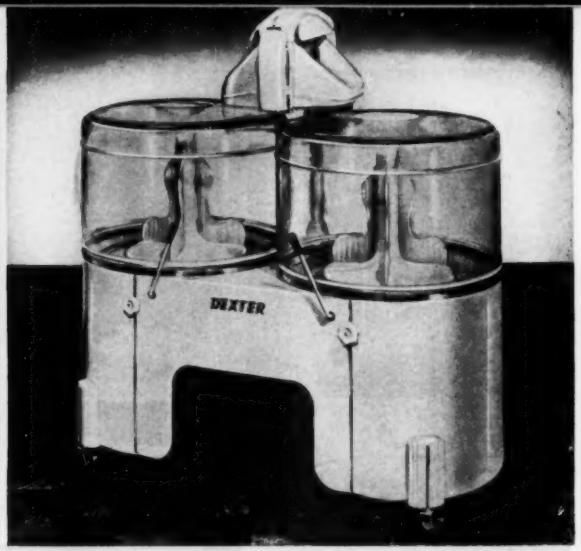
snaps back to take the exact shape of the male form.

Another production method consists of constructing a plaster of paris duplicate of the production model and from this building wooden forming dies. Then a sheet of acrylic is cut to size, heated in an oven, clamped to the form, and permitted to cool.

Yet another method of manufacturing demonstrator models, and one that can be most economical, is used when the production item itself is molded of plastic. When such is the case, the transparent parts can sometimes be molded in the same dies used to produce the opaque parts.

The sales demonstrators illustrated and described here are representative of the ever increasing trend toward using acrylics as a means of producing increased sales and consumer recognition of a product. The possibilities of using transparent acrylic to point up specific features of various types of merchandise are unlimited. Shiny or chromium-plated exteriors can sometimes sell the product, but acrylics will supply the clear, unrestricted inside view that is so often necessary to convince prospective customers. Anyone who has a working product to sell and who wants to dramatize it to the utmost may well find the answer in transparent acrylics.





COURTESY ROHM & HAAS CO.

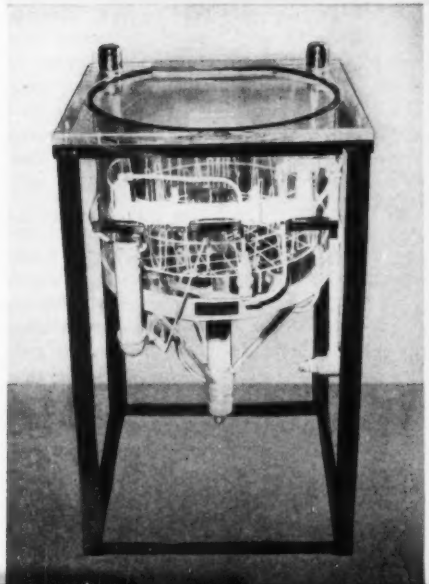
An unusual acrylic demonstration model is used by the Nik-O-Lok Co., Indianapolis, Ind., to show the operation of its coin-operated lock mechanism. It is built from a plaster of paris duplicate of the production model, from which forming dies are made to shape the plastic parts. The transparent acrylic unit enables prospective customers to become aware of the complexities and, at the same time, of the rugged construction of the coin-operated lock

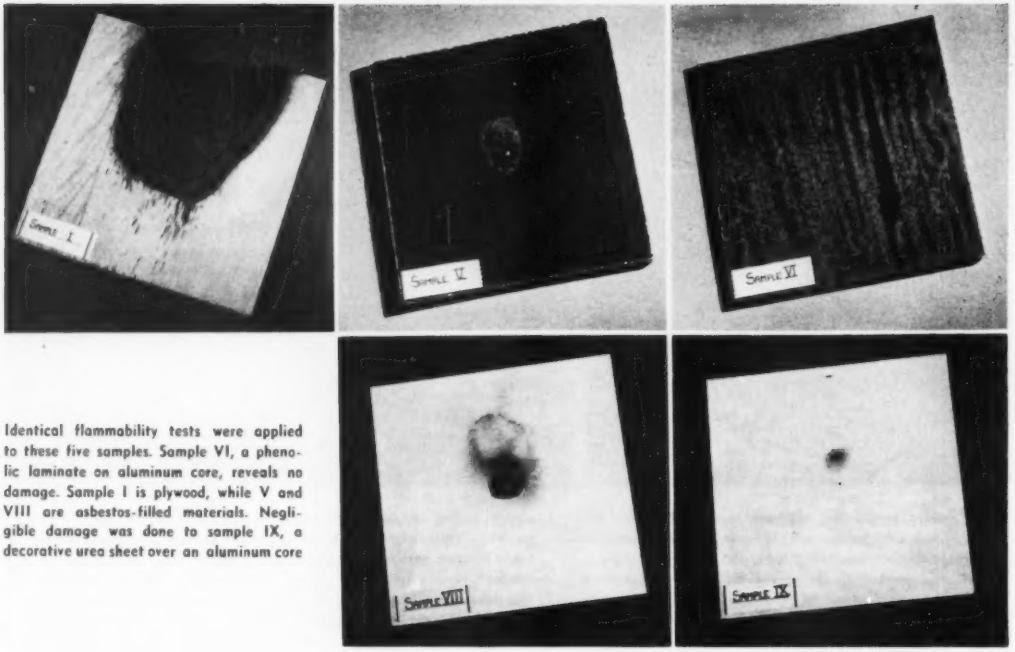
Acrylic models of washing machines are helpful sales aids even if the machines are conventional in design and operation. To show prospective customers the inside operation of its washer, the Dexter Mfg. Co., Fairfield, Iowa, had Regal Plastic Co., Kansas City, Mo., fabricate transparent acrylic tubs and lids. The acrylic parts are fabricated to the exact proportions of the opaque production models. The transparent demonstrators are installed in major sales outlets. Acrylic has proved well able to withstand all the mechanical stresses and pressures involved

The cleansing action which takes place inside the General Electric dishwasher is revealed through an acrylic tub fabricated by Steiner Plastics Mfg. Co., Inc., Long Island City, N. Y. Steiner uses a snapback vacuum process to make the tub. Other acrylic parts include the cover, the back splash, and motor parts which are encased in transparent blocks

Sales of hand- and tank-type vacuum cleaners made by Eureka Williams Corp., Detroit, Mich., are being boosted by means of transparent acrylic demonstrators. Fabricated by Benson Products Co., Dearborn, Mich., the demonstrator models are full size operating units. The tank type cleaner has an acrylic housing, while the vertical model has an acrylic housing over the motor, which duplicates the metal base of the retail unit

COURTESY ROHM & HAAS CO.





Identical flammability tests were applied to these five samples. Sample VI, a phenolic laminate on aluminum core, reveals no damage. Sample I is plywood, while V and VIII are asbestos-filled materials. Negligible damage was done to sample IX, a decorative urea sheet over an aluminum core

British Laminate Is Non-Flammable

NEW vistas on the decorative laminate front—with both domestic and commercial possibilities—have been opened by the development, under the Warerite name, of a plastic surfaced sheet having an aluminum core. Created by Bakelite, Ltd., London, England, the new material—not to be confused with heat resistant laminates embodying aluminum foil immediately under the surface sheet—not only has desirable mechanical features, but also stands up under severe flammability tests.

The new material may have a core of either pure aluminum or aluminum alloy. Although it is possible to employ any core thickness, officials of Bakelite, Ltd., state that production economies dictate concentration on two standard thicknesses: a B.A. 60 half hard 14-gage core (0.08 in.), and a 20-gage (0.036 in.) pure aluminum core. When based on the 20-gage core. the Warerite laminate has a facing on each side of 0.02 in. phenolic sheet. The decorative surface may be had in black or any standard dark color, and in wood grain or pattern design. The core permits the sheet to be easily formed or bent, even to small radii. Bakelite, Ltd., technicians report that such formed shapes are less prone to return to the original flat sheet than are ordinary paper laminates.

Withstands flammability test

Whereas other plastics laminates used for decorative purposes cannot withstand severe flammability tests, phenolic and urea faced metal core laminates have qualified for the non-flammable classification, thus substantially enhancing their prestige for decorative use in ships, trains, and planes. In comparative tests, the light alloy cored sheet was found to withstand flame better than sheets bonded with phenolic resin and filled with glass or asbestos fabric.

The new material possesses two additional advantages: stability and decorative flexibility. While conventional laminates tend to buckle between fixed points under varying atmospheric conditions, the metal cored material did not bend even after undergoing an extended water immersion test. Another asset, the British officials point out, is that the metal core, when exposed by machining away the plastic facing, presents diversified decorative potentials without requiring a second material.

Acetate Lace of Many Uses

THE continuing search for materials with multiple applications and the ability to withstand hard wear has resulted in the development of a new lace-like plastic fabric by the Minnesota Mining & Mfg. Co., St. Paul, Minn. Marketed under the name Lacelon, the product is a non-woven cellulose acetate which is finding its way into such diverse fields as millinery, gift packaging, and in connection with floral decorations.

In fabrication, Lacelon may be heat sealed or formed by direct heat application, using steam or hot water. The thermoplastic material is compatible for lamination with other plastics. It may be roll cast in place with a transparent adhesive when combining it with paper, cloth, and other acetates.

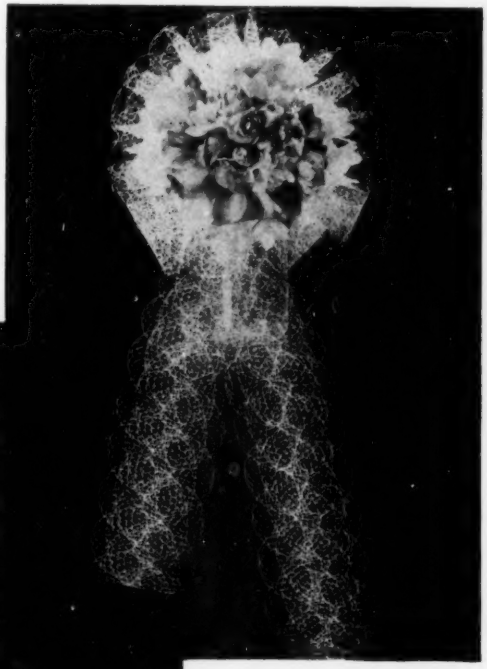
Considerable emphasis has been placed upon the use of the material in making ladies' hats. A noted New York milliner recently conducted a style show devoted exclusively to creations of Lacelon. Factors influencing its adaptation to hats include: it will not wilt in water, and thus can be washed or worn in the rain; it will not fade in the sun; it is lightweight; it is flame-resistant; and it will not run or unravel. In addition, it may be sewn by hand or machine, and is available in a wide variety of colors.

Packaging functions

Lacelon is distributed in two forms: as ribbons in 3 and 5-in. widths with scalloped edges; and as sheets 36 in. wide, without scalloped edges. Its use in packaging has been directed principally at gift wrapping. In that capacity, it is offered to department and gift stores and variety outlets with gift-wrapping departments. To facilitate its resale by retail stores in yard-goods form, the product is furnished in 50-yd. rolls.

Since the cobweb-like material will withstand refrigerator storage, it has found favorable reception by florists who use it to make corsages in advance of sale.

Minnesota Mining is also merchandising a similar type materal called Mistlon, in solid ribbon form for gift packaging purposes. This product is provided in 14 colors on 100-yd. rolls, in widths of ½, ¾, 1¼, and 2 inches.

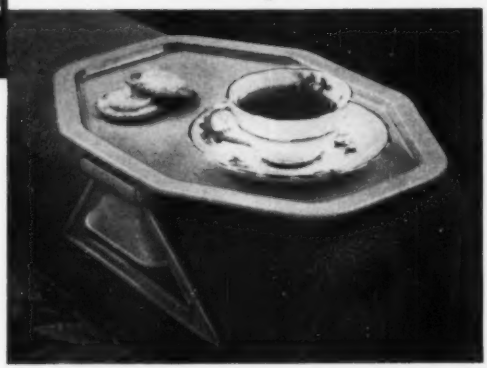


Acetate lace, able to withstand refrigeration, is used as corsage trimmings

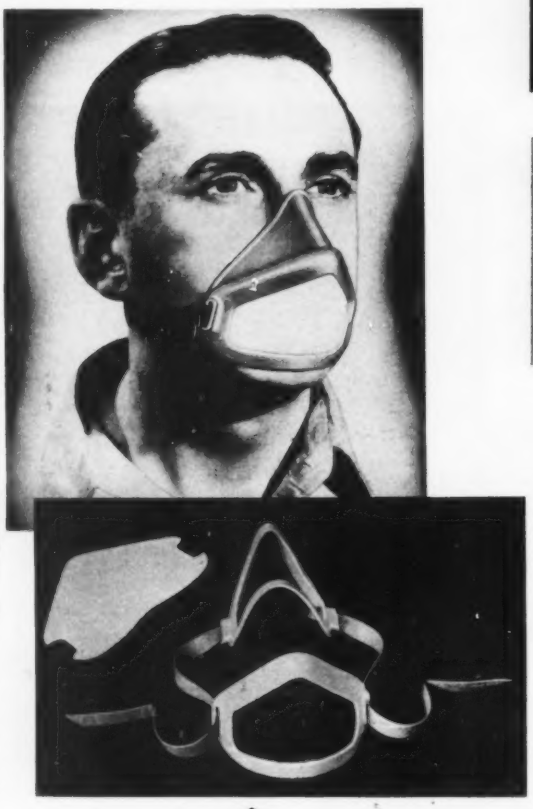
Non-woven, cellulose actate lace for millinery is flame and water resistant. Cobweb-like material also serves as decoration in gift wrapping packages

Wax paper dispenser molded of polystyrene has a rack on top for condiment set. Paper compartment is completely enclosed and paper tears smoothly against serrated cutting edge. Dispenser can be placed on a shelf or mounted with simple wall brackets. Manufactured by Bernard Edward Co., 5252 S. Kolmar Ave., Chicago, Ill.

For tea drinkers who are not professional jugglers, Serv-All armchair tray provides a convenient place to set down the teacup and sandwiches. Tray is held firmly in place by two spring-loaded legs which fold when tray is not in use. The tray and legs are molded of Plaskon urea by Alomar Molded Products, Inc., 1163 E. Hyde Park Blvd., Inglewood, Calif.

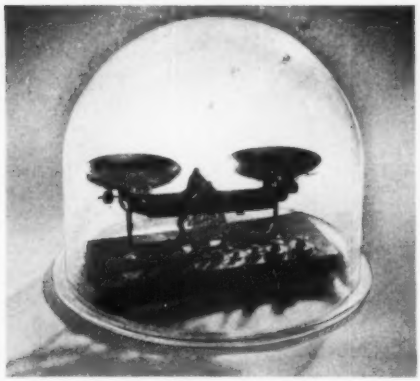


PLASTICS



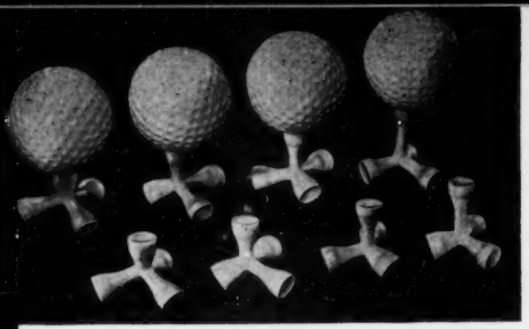
Flex-A-Foam filter mask, for protection against non-toxic dusts, weighs only 1 oz. and is flexible enough to fit over any wearer's face. The two-part frame is molded of Du Pont polyethylene. The parts interlock to hold the whipped foam latex filter in place. The polyethylene frame is odorless, easily cleaned, and virtually unbreakable. Mask is made by The Goggle Parts Co., 1468 W. 9th St., Cleveland 13, Ohio

Bell jars for protecting balances, microscopes, and other laboratory instruments are formed of Lucite acrylic sheet. The plastic jars are lighter than glass and virtually eliminate the breakage problem. A 10¼-in. i.d. jar 9 in. high is formed of ⅜-in. thick sheet and a 7-in. i.d. jar 5⅝-in. high of 5/16 in. material. The jars are made by Durable Formed Products, Inc., 6 Greene St., New York, N. Y.

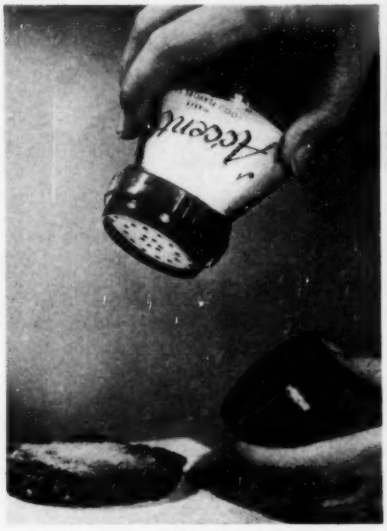


PRODUCTS

New inexpensive dishes for picnic or table use are molded of high heat resistant Lustrex polystyrene. Individual place setting, consisting of dinner plate, salad plate, cereal bowl, cup, and saucer, is packaged in colorful carton with transparent top. Dishes are made in pink, green, gray, or beige by Plas-Tex Corp., 2525 Military Ave., Los Angeles



Golf tees molded of Bakelite polyethylene have four legs, each a different length. User thus can choose the ball height which suits his game. Tee does not have to be stuck in the ground; thus hard ground presents no problem. Teal Molding Co., P. O. Box 3115, New Haven 15, Conn., molds the tees in various colors for Four-Up-Tee Co., 100 Stevens Ave., Mount Vernon, N. Y.



Two-piece cellulose acetate dispenser type lid adds to the utility and attractiveness of glass jar package for Ac'cent food flavor enhancer. Bottom part of the lid is a perforated shaker which screws onto the jar; top part is a friction-fitting cap. Both parts are molded of Tenite I cellulose acetate by Federal Tool Corp., 3600 W. Pratt Blvd., Chicago, Ill. Ac'cent is a product of Amino Products Div., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago

Dressing table is made up of matching chests and vanity top covered with quilted and shirred Satintone, a Vinylite film with a lustrous, satin-like sheen. Chests are part of new line of wardrobes, chests, and other space savers with matching garment bags, shoe bags, etc. Space savers are made by E-Z-Do, garment bags are made by Princess House Closet Accessories, Inc., both of 261 Fifth Ave., New York 16, N. Y.

Mirror and convenient storage tray for beauty accessories or shaving equipment are combined in the Quick Primp. All parts except the glass mirror are molded of red, yellow, white, or ivory polystyrene or of mottled gray ethyl cellulose by Columbus Molded Plastics Corp., 1703 Keller Ave., Columbus, Ind. The Quick Primp unit is manufactured by W. F. Goodell Co., 1743 Fleming Road, Louisville 5, Ky.

Automatic poultry waterer capable of accommodating up to 250 broilers has round trough molded of white Beetle urea. The plastic tray (inset) is lighter than glass, easy to clean, and durable. The 8¾-in. diameter tray is molded by Hafleigh & Co., Buchanan, Va. Waterer is made by Shenandoah Equipment Co., Harrisonburg, Va.

PLASTICS

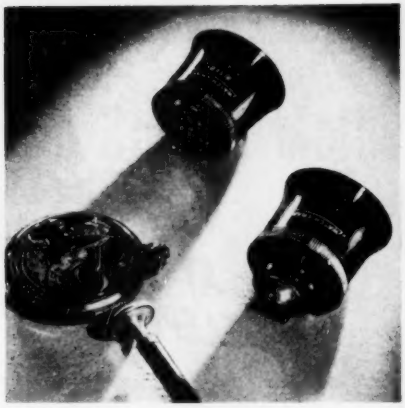
Life-like dolls and puppets are made from Geon vinyl paste resin. The toys, perfect miniatures to the last detail, are molded from a plastisol formulation, flesh-tinted, then costumed. Their flexibility makes them unbreakable. They are warm, soft to the touch. Made by Lastic-Plastic, 3330 Burton Ave., Burbank, Calif.

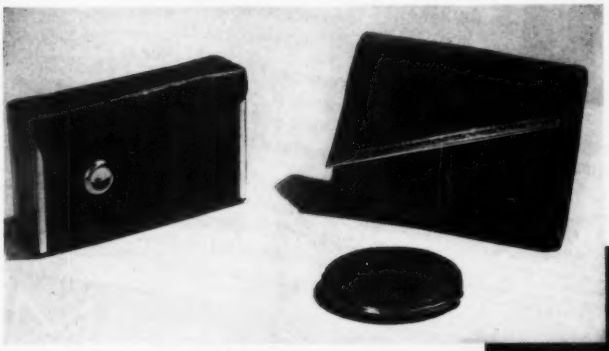
Three-purpose tray molded of Bakelite phenolic comes to the table with four glasses set in the molded-in coasters and potato chips or nuts in the roomy center compartment. After the refreshments are consumed the tray can be used as a king-size ash tray. Made in black, red, walnut, or green by Count-Rite Corp., 5611 Hough Ave., Cleveland, Ohio

Transparent jar molded of Tenite II cellulose acetate butyrate is used on Caterpillar tractors to catch the heaviest particles of dust and dirt before the air enters the carburetor air filter. The butyrate jar combines transparent clarity and ability to stand up under rough working conditions. The jars are molded for Caterpillar Tractor Co. by The Lakone Co., 500 Rathbone Ave., Aurora, Ill.

PRODUCTS

Frames for watchmakers' eye loupes are molded of Tenite I cellulose acetate. Ground lenses are inserted into the frames under pressure and held in place by the resilient plastic. The frames are light in weight, durable, and pleasant to the touch. Keolyn Plastics, 2729 N. Pulaski Rd., Chicago, Ill., molds the frames for eye loupes made by C. & E. Marshall Co., 1445 W. Jackson Blvd., Chicago





Fitted evening bags are made of 12-gage Koroseal vinyl sheeting. Compacts, cigarette cases, and other accessories are covered with the same attractive, long-wearing material. Lin-Bren Products Corp., 805 Mamaroneck Ave., Mamaroneck, N. Y., makes the bags and Charles K. Everett, Ltd., 347 Fifth Ave., New York 16, N. Y., is the national distributor

Gardenette bowl for growing house plants has water-well molded in one piece with the cover. Well extends almost to bottom of the bowl and provides all moisture by sub-irrigation. Entire bowl is molded of Lustrex polystyrene by Panamerican Plastics, Inc., 9217 Weiss St., Dallas, Texas, and sold by Plastiglobe, Inc., Maverick Bldg., San Antonio

YOU'LL GET A LAUGH OUT OF THIS . . . (we did)

Midland has been quite proud of its delivery schedule for the past few years and we have, of course, advertised it consistently on these pages for many months. We did get behind on an order from Patent Button Company, Knoxville, Tennessee, and their Mr. Snoddy prepared the advertisement below which is a perfect image of our "cat" advertisement with just a few changes. Our hat's off to Mr. Snoddy for some mighty good copy. P.S. They have their Hobbed Cavities now so we're all set to handle your requirements!

delivery?

AT MIDLAND IT'S FASTER THAN AN ELEPHANT CAN HAVE LITTLE ELEPHANTS!

This wall socket hobbed cavity by Midland incorporates two narrow "T" projections raised 3/16 inches above the cavity surface. By using hobbed cavities of this type in place of the conventional insert cavities, all unsightly parting lines were eliminated and in addition to improving appearance, the hobbing was accomplished at only a fraction of the cost of cavity duplication by machining methods.

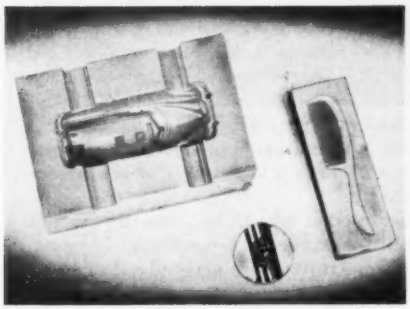
Yes, actually! It takes an elephant two long years—but when Midland gives birth to a plastic mold—she seldom stays in labor for more than four or five months. Of course the whole period is longer than that but it is not often that eighteen months is exceeded between conception (of mold design) and delivery.

So if you have a gleaming idea for a molded product, just grab it by the tail and pitch it over to MD&E where delivery is gauged by elephantine standards.

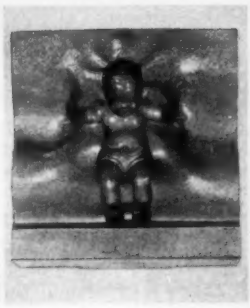
For a clear picture of our equipment and our know how (but not when) write for a copy of "Shaping Tomorrow Some Other Time". Better still, send in your prints—at least two years before you need the tools.

MIDLAND DIE AND ENGRAVING COMPANY
1800 W. BERENICE AVENUE • • • CHICAGO 13, ILLINOIS
Makers of Plastic Molds • Die Cast Molds • Engraved Dies • Steel Stamps • Hobbings • Pantagraph Engraving

D&E



1—Beryllium copper molds. Toy car mold is sand cast; monogram is investment cast; and comb is pressure cast



2—Pressure-cast cavity for toy doll—as cast and liquid honed

3—Circus wagon shows detail possible by pressure casting without finishing or polishing

Cutting Costs With Beryllium Copper Molds

by RICHARD A. BURKETT and JOHN T. RICHARDS†

AT the present time, beryllium copper finds wide use as a material for cavities and forces in the injection molding of industrial and novelty components. The properties of this alloy, combined with improved casting procedures, offer important cost saving opportunities in the preparation of molds and the manufacture of plastic parts.

In many instances, cast beryllium copper gives decreased tooling and production costs. Through casting, expensive machining can be substantially reduced or even eliminated. Some caution should be exercised, however, to prevent misapplication, since beryllium copper is not invariably the lowest cost answer. It is corroded by certain types of plastics, so that, for best results, chrome plated mold surfaces are recommended for use with phenolics or vinyls. Chrome-plated beryllium copper has a long life because the plating tends to wear uniformly and is not likely to develop pinholes.

Advantages

Through age-hardening, beryllium copper offers the following properties which are favorable for the efficient production of molds:

1. Excellent castability, which means that molds can be produced by regular foundry methods including sand, investment, or pressure casting.
2. Beryllium copper can be readily worked or machined (if necessary) in the soft condition, then hardened by a simple low-temperature heat-treatment.

In plastics moldings, the excellent wear resistance and impact strength of beryllium copper gives long production runs. It hardens uniformly throughout the castings. In addition, beryllium copper offers good resistance to moderately elevated temperatures with maximum service temperature in the range of 400 to 500° F., depending upon time at temperature.

Selection of material

Best results have been obtained through the use of the following beryllium copper alloy (Berylco 275C):

Beryllium	—2.75%
Cobalt	—0.50%
Copper	—Balance

Table I lists typical physical constants for this alloy, while Table II gives average mechanical properties.

By virtue of the wide range of available properties, molds of this material are used in many fields, including mechanical, electrical, automotive, decorative, toy, novelty, jewelry, and others.

Mold production methods

The choice among pressure, sand, or investment casting of beryllium copper molds is, of course, de-

*Reg. U. S. Patent Office.
†The Beryllium Corp., Reading, Pa.

Table I. Typical Physical Properties of Heat Treated Beryllium Copper

Specific gravity	8.09
Density (lb. per cubic in.)	0.292
Maximum increase in density on heat-treatment (%)	0.6
Maximum decrease in length on heat-treatment (%)	0.2
Specific heat (cal. per gm. per °C.)	0.10
Magnetic susceptibility	Negative
Melting range (°F.)	1585-1750
Average coefficient of linear expansion (per °F.)	0.0000095
(per °C.)	0.0000171
Thermal conductivity:	
(BTU/sq. ft./in./hr./°F.)	800-900
(cal./sq.cm./cm./sec./°C.)	0.27-0.31

pendent upon economic and performance requirements. However, among most molders, the "pressure-cast" or "hot-hobbed" method of producing force plugs and cavities is considered to be outstanding as far as quality and accuracy are concerned. The following sections discuss production limitations, design considerations, and suggested casting techniques. Figure 1 illustrates typical molds produced by each method.

Pressure Casting—For applications requiring multi-cavities, pressure castings generally prove to be most economical. These are produced by pouring molten beryllium copper around a master hob and applying pressure. Solidification takes place under pressure, producing an unusually dense structure with good impact and compressive strength and a smooth surface. Accurate reproduction of intricate detail, thin sections, irregular parting lines, and raised letters or numbers are obtained by this method.

Since cavities are produced from master dies or hobs, multiple cavities of exact likeness may be produced at a relatively low cost. As many as 150 pressure-cast reproductions have been reported to have been obtained from a single hob; however, under average conditions hobs generally show signs of wear after 50 or more molds. Furthermore, mold maintenance costs are minimized because a cavity, if damaged in production, can be immediately replaced by low-cost spares kept on hand.

In addition, it is possible to produce cavities from fragile hobs with little if any danger of hob breakage.

In contrast to other type molds, pressure castings do not require expensive finish machining; however, as a final operation, they are generally cleaned by liquid honing. For the production of certain small parts, it is possible to pressure cast a multiple mold as a single rigid piece, which eliminates setting-up several individual molds in the retainer plate.

Existing equipment limitations generally restrict sizes to less than 144 sq. in. of casting area, although at least one producer can handle castings up to 200 square inches. Cast tolerances on molds can be held under certain conditions to 0.002 in. per in.; however, tolerances generally average 0.004 in. per inch.

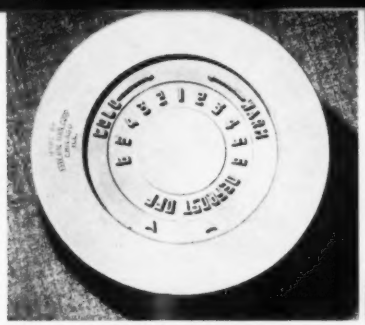
Figures 1 through 7 illustrate typical molds for industrial and novelty parts pressure cast with beryllium copper. Figures 2, 3, 5, and 7 show sharp detail and versatility of process, while Fig. 4 and 6 give examples of raised sections and lettering. In all cases, molds are shown as cast and liquid honed.

The following equipment is required for pressure casting work:

1. Melting furnace capable of bringing metal to 2000° F.
2. An annealing or soaking furnace having temperature control of at least plus or minus 10° F. up to 1450° F.

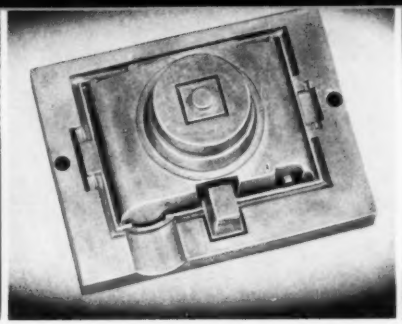
Table II. Typical Mechanical Properties of 2.7% Beryllium Copper

	As cast	*Cast and heat-treated*	*Cast and solution annealed*	*Solution annealed and heat-treated*
Tensile strength—p.s.i.	100,000-110,000	120,000-130,000	75,000-85,000	170,000-185,000
Yield strength (0.2% offset)—p.s.i.	85,000-95,000	100,000-110,000	40,000-50,000	140,000-155,000
Elongation—% in 2 in.	15-20	4-6	20-25	1-2
Rockwell hardness number	B95-B100	C28-C33	B75-B80	C42-C48
Brinell hardness number	210-240	270-305	137-150	393-460
Compressive strength to produce permanent set				
(0.1% in 1 in.)—p.s.i.		90,000-100,000		190,000-210,00
(1.0% in 1 in.)—p.s.i.		105,000-115,000		210,000-230,000
Ultimate compressive strength—p.s.i.		175,000-185,000		230,000-350,000

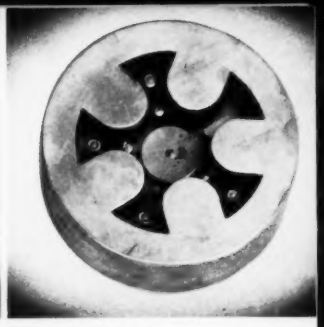


ALL PHOTOS COURTESY THE BERYLLIUM CORP.

4—Beryllium copper pressure casting with raised letters and numbers for refrigerator control dial



5—Force for camera body illustrates versatility of a typical use of beryllium copper pressure-cast mold



6—Pressure-cast cavity with raised sections would be hard to machine

3. A two-speed hydraulic press of 200 tons capacity.
4. A roller conveyor from soaking furnace to press bed.
5. Beveled chase and shim plates of hot-rolled steel to size.

The hob should be machined from good air-hardening steel and heat-treated to approximately Rockwell C-52. Recommended steels include Carpenter (883), Hoyland (HSC-33), Vanadium (Hot Form No. 1), and Kloster (Pure-Ore D-C-66). For short runs, 5% chromium-iron hobs give good service and can be economically cast and machined.

In designing, the lightest section of the hob should have a backing of at least 1½ inches. Raised letters or numerals should have 5 to 10° draft. The outside dimensions of the hob base should be 1/16 in. greater on all sides than those desired on the finished mold. In order to allow for shrinkage during casting, the hob should be made 0.004 in. per in. oversize.

In regard to parting lines, the hob should be designed to provide on the cavity a ⅛ in. "over-depth" which is subsequently removed when the two halves of the mold are matched. Irregular parting lines are finished to the desired size on the hob.

Some care should be taken in the preparation of hobs, since the detail and surface condition of the mold will be determined by the finish of the hob. Hobs must be carefully examined for cracks, undercuts, or rough areas, since these defects may cause the hob to rip the casting when removed.

The following outline briefly covers the required steps in producing pressure castings:

1. The hob should be thoroughly covered with a parting agent to facilitate its separation from the casting.
2. The assembly of shim plates and hobs is heated to approximately 1100° F., while the beryllium copper is being melted.
3. Beryllium copper is melted as quickly as possible. No flux or cover is required for melts under 50 lb.; however, a charcoal cover may be used for larger melts.
4. The hot assembly is then brought from the furnace by means of the roller conveyor and the master chase is lowered into place.
5. The metal is poured in the range of 1900 to 1950° F. over the hob and pressure is applied as rapidly as possible. Freezing of the metal before pressure is applied will result in a poor casting.
6. The hob and casting are separated while the casting is still hot.
7. Castings are then annealed in the range of 1350 to 1400° F. with time at temperature sufficient to insure that all portions of the casting are within this range. Do not hold at this temperature for any length of time.
8. Quench in water or oil immediately upon removal from the furnace.
9. Liquid hone.
10. The outer shell of the mold is then machined as required while casting is in this soft condition.
11. Castings are then heat-treated for 3 hr. at 600° F. followed by cooling in air.
12. Liquid hone.
13. Polish or plate when necessary.

In addition to pressure casting molten beryllium copper with a steel hob, it is also possible to pressure cast beryllium copper with a hardened beryllium copper hob. Through this process, beryllium copper forces and cavities can be readily obtained from either a steel force or cavity.

Sand Casting—Sand-cast cavities and forces generally prove most economical where few molds are required or where sizes are greater than usually handled by pressure or investment casting. Selection generally boils down to whether sand casting plus finish machining and polishing is cheaper than the hob cost in pressure casting and whether or not accuracy in dimension and detail is important. In general, the properties of sand-cast molds are not as high as those obtained in pressure or centrifugal-investment castings.

For sand-cast molds, a wood, plaster, or aluminum pattern is first constructed with a 3/16 in. per ft. allowance for shrinkage. In some cases, it may also be desirable to leave a small allowance for machining or polishing, while an "over-depth" of ⅛ in. is required for cleaning up regular parting lines in matching the halves of the mold. The pattern must

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Table III.—Turning and Milling Speeds and Feeds

	Roughing		Finishing	
	Speed	Feed	Speed	Feed
	fpm	in.	fpm	in.
Turning	100-200	0.008-0.012	150-300	0.002-0.008
Milling	150-200	0.015-0.030	200-300	0.008-0.015

be prepared with care, since the surface and definition of detail on the casting will be no better than that of the pattern. Fine molding sands assist in reducing final machining and polishing.

The excellent castability of beryllium copper, as measured by its good fluidity, yields sand-cast molds with relatively smooth surfaces and a high degree of detail. Ordinarily, finishing is limited to machining the outer shell, cleaning up the parting line, and polishing the mold face. Tolerances of the order of plus or minus $\frac{1}{64}$ in. can be held over most dimensions. For non-critical applications such as dolls or toys, sand casting may offer the lowest cost answer.

Figures 1 and 8 show typical sand-cast molds for novelty parts prior to finishing and polishing.

Foundry methods for sand casting beryllium copper are similar to those generally employed in handling aluminum or manganese bronze. To minimize oxidation and gas absorption, the charge should be melted as rapidly as possible with little agitation and poured in the range of 1900 to 2000° F.

Following solidification, sand-cast molds should be solution annealed for at least 3 hr. at 1450° F., then immediately quenched in oil or water upon removal from the annealing furnace. Rough machining, such as turning the outer shell to size or cleaning up the parting line, should be carried out in the solution-annealed (soft) condition.

In order to attain optimum compressive strength and resistance to wear, castings must be heat-treated for 3 hr. at 600° F. followed by cooling in air. Any type furnace offering temperature control of the order of plus or minus 10° F. is suitable for hardening molds.

Finish machining, polishing, and plating operations, where required, follow the hardening heat-treatment.

Investment Casting—Investment casting is used for the production of small intricate parts that would be difficult to cast by other methods. Investment casting may be cheaper than pressure casting, since a machined steel hob is not required.

On account of the high fluidity of beryllium copper in the molten state, investment-cast parts can be produced with a high degree of detail or intricacy without machining. In the production of investment-cast molds, polishing is generally the only finishing operation required.

When necessary, tolerances can be held to 0.002 in. per in., and on small dimensions tolerances of 0.001 in. per in. can be maintained under certain conditions. Minimum wall thicknesses range from 0.030 to 0.050 in., depending upon taper and section area. Examples of investment-cast molds are shown in Figs. 1 and 9.

The following production procedure has been found to offer good results for producing investment-cast molds from a model or final part without a steel master die:

1. The model, of material that does not easily break, is mounted into a clay base above the midpoint.
2. Cerrobend or similar material is poured into a flask containing the clay base and the mounted model. The resulting casting provides a solid base for the model.
3. Hot wax is then poured into the flask containing the Cerrobend base with model and pressure applied.
4. The resulting wax cavity is mounted on either a rubber or wax base.
5. The investment is poured into a flask containing the wax cavity and a vacuum is applied.
6. The investment is placed over hot water and the wax melts out.
7. The investment is dried by heating to around 1000° F.
8. The beryllium copper is then poured in the range of 1900 to 1950° F. by either centrifugal or gravity methods.

After removing the solid casting from the investment, it is necessary to anneal and heat-treat as indicated above for sand casting.

Processing

Heat-treating—The most favorable properties of beryllium copper result from a two-step thermal treatment consisting of 1) solution-annealing and 2) hardening. In certain cases, castings are hardened directly from the "as-cast" condition by heating for 2 to 3 hr. at 600° F. Although this method saves several steps, it does not produce maximum strength, hardness, or thermal conductivity.

As cast, beryllium copper has a hardness of Rockwell B95-100 (210-240 Brinell). With solution-annealing, at times and temperatures given above under the various casting processes, the hardness decreases to B75-80 (137-150 Brinell). Rough machining should be undertaken while the mold is in this soft condition. Heat-treating for 3 hr. at 600° F. increases the hardness uniformly throughout the mold to C42-48 (393-460 Brinell).

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in annealing and hardening, providing the temperature can be controlled to plus or minus 10° F. Salt baths are generally not used for mold work.

Machining and Polishing—In the unhardened condition, beryllium copper can be machined in a manner similar to non-leaded bronze. Although beryllium copper is not a free machining material, it can be easily handled with the proper tools, feeds, speeds, and cutting fluids.

For turning and milling, good results can be obtained with high speeds, light feeds, and moderate depth of cut. The speeds and feeds with standard high speed steel tools shown in Table 3 are suggested for castings in either the "as-cast" or "solution-annealed" condition.

Standard high speed steel twist drills available from stock give good results with a light feed at 60 ft. per minute. A soluble oil coolant is recommended. For tapping, standard taps can be used at 35 to 45 ft. per min. with mineral-lard oil.

Since beryllium copper is readily ground in any condition, castings are generally finish ground after heat treating. Gates and risers are removed prior to hardening by saws or abrasive cutoff wheels.

If a high polish is desired, castings should be hand-polished in the hardened condition. Pressure castings are generally polished only in the most critical applications; however, investment- or sand-cast molds always require polishing in order to obtain the desired surface condition. Although requiring less time, beryllium copper can be polished in a manner similar to steel and a finish of 1 to 2 micro-inches can be quickly obtained. Pressure castings are generally liquid honed following annealing and hardening treatments.

Joining—Welding or soldering is sometimes used to assemble separate molds into multiple cavities. Although beryllium copper can be soft or silver soldered and carbon, metallic, or inert-arc welded, no satisfactory process has been devised for hard brazing or fusion welding. In general, however, welding is not recommended, since the temperatures used have a deleterious effect upon the structure of beryllium copper and may possibly lead to distortion or softening.

By careful machining, cavities can be fitted into retainer plates and held with screws.

Plating—Beryllium copper can be readily plated with any of the plates and methods generally used with high-copper alloys. For resistance to corrosion from phenolic or vinyl plastics or rubber, molds are generally given a flash chrome plate, 0.003 to 0.006 in. thick.

Acknowledgments

The authors acknowledge the assistance of General Mold Casting Co., Newark, N. J., and Federal Tool Corp., Chicago, Ill., in providing much of the subject material used in illustrating this paper.

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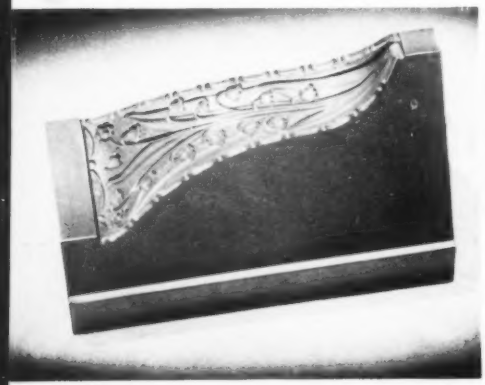
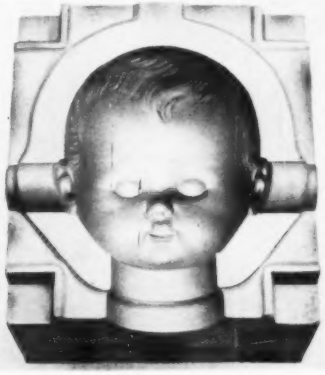
7—An example of sharp detail which can be achieved in pressure casting is this cavity for bell section



8—Cavity for doll head—as sand cast in beryllium copper mold, prior to polishing



9—Cavity for an investment-cast figure before cleaning

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Pointers on Pin Points

by C. G. CARLSON* and E. M. MAY†

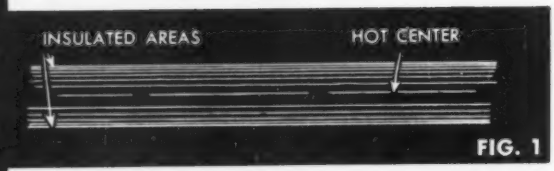

FIG. 1

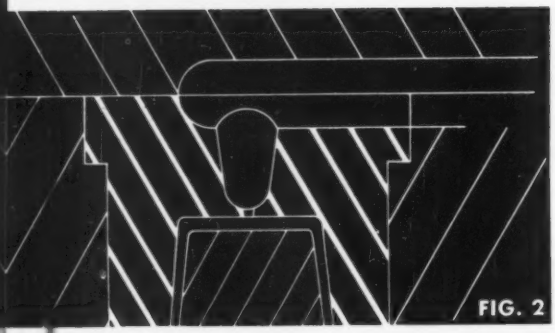
FIG. 2

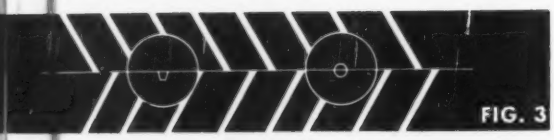
FIG. 3

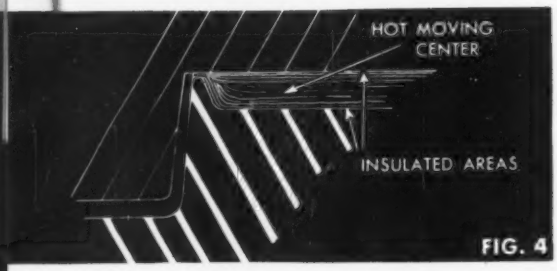

FIG. 4

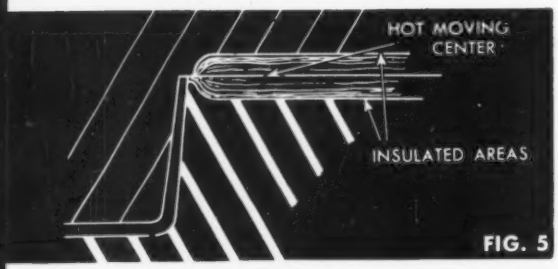

FIG. 5

Despite all of its practical virtues and purposes, pin point gating has enjoyed an evolution that has contained as much drama, mystery, and surprise as a best-selling thriller.

It is generally thought of as a "war baby." Although a number of individuals have made outstanding contributions to the unfolding and successful application of pin point gating, it is hardly possible to list names because of its mushroom-like origin and growth. It is conceded, however, that pin point gating is chiefly a product of the Pacific Coast molding industry—and credit belongs to the many molders and mold-makers who have participated over the years in improving the techniques involved.

PIN POINT gating is popularly thought of as a small gate at the center of a bowl-shaped casting. However, pin point gating should be defined as: 1) Use of a very small gate placed where it will do the most good. 2) Use of a gate designed in such a way as to be the least noticed. 3) A method enabling the runner to break free from the molding, requiring no further trimming. 4) A procedure in which the gate is placed to give the best structural condition. To accomplish all this requires a careful study of the part to be molded.

Basic flow pattern

From the evidence that has been gathered, a basic flow pattern has been established which influences the design of every mold made in our plant. This resolves itself around the theory that the thermoplastic material flows from the center out and lies against the confining walls of the runners, cavities, and cores. This forms an insulating area (Fig. 1) with the hot material moving through the center.

At Caco, we are at present using only two types of pin point gates.[1] One is the round gate; the other, the rectangular gate (Fig. 3). These two types are adequate for any requirements. The old "fan" gate is no longer used in our shop because it upsets the basic flow pattern. The round design is used and

*General manager and † shop superintendent, Caco, Pomona, Calif.

[1] *Editor's Note:* The technique of pin point gating is still not completely understood in many quarters. Certain materials and certain molded sections have given trouble when pin point gates were used. As knowledge of this method is increased by work such as that reported in this article, it is probable that pin point gating will be more universally used.

preferred where the gate can be cut on both sides of the parting line, or where an independent sprue is used (Fig. 2). The tapered rectangular gate is used where only one side of the parting line can be cut (Fig. 3). In the old style designs, the runners and gates were cut in one side of the parting line. This is one reason such high pressure was required to fill the cavity. The insulating area choked the gate with cool material, and prevented the hot center from having easy access to the cavity (Fig. 4). In the modern design the material is directed into the cavity in a natural way—through the center (Fig. 5). The size of the gate should be from 0.0002 to 0.001 sq. in. in area, depending upon the size of the molding, number of cavities, and type of material. (Styrene smallest; acetate next larger; methyl methacrylate largest.) If the gate size/wall thickness ratio at the gate is less than 1 to 2, there is danger of the gate pulling a hole in the part. To produce the cleanest molding, a taper of 30° should be cut in the gate (Fig. 2). This will allow the gate to break even with the casting. In a multiple cavity mold these gates should be within 10% of each other in size.

Restricted flow

The art of pin point gating was materially advanced by including the principles of restriction of material flow in the mold design. Ideally, the material should reach each cavity at the same instant. To assure that this will happen, the runners are reduced in size as the cavities are approached. In Fig. 6, a gate runner 5/16 in. in diameter is illustrated; 7/32 in. lateral runners join the main 1/4 in. sprue runner. With these restrictions in size, the material is retarded at each turn of the runner and reaches all cavities simultaneously. The runners need only be smooth enough to assure easy removal of the plastic. The size of the gate runner should be 5 to 10 times the gate size, depending upon size and shape of molded piece.

Where there is greater variation in size and shape of parts in one mold, it is found necessary to restrict the gate size of the smaller parts to control the density of the moldings. This will assist in keeping the shrinkage rates the same in all size castings.

One other factor that is equally as important as restricted flow is a balance of cavity layout. As greater accuracy in parts was being increasingly requested, more study as to why and how finally produced a design that answered this need (Fig. 7a). As each cavity has exactly the same pressure applied, the parts are exactly alike. This precision makes possible the economical mass production of an interchangeable accurate part with remarkably close tolerances. When precision parts are not required but small gates are desired, a conventional runner system can be used by cutting the sprue runner quite large in cross section, and the lateral runner short in length (Fig. 7b).

The operation of many existing molds has been improved by welding improper gates and re-locating and re-cutting new ones. This equalizes the pressure on each cavity, which in turn provides easy ejection of parts, where formerly too much pressure was required on one cavity to fill another, resulting in stuck castings and uneven wear on the ejector system. This is especially important where a single ejector bar is used. Not only was the production of these molds increased (doubled in some instances), but a great savings in finishing cost was realized. Mold temperature control is also a contributing factor in efficient molding.

These design principles also work well with thermosetting compounds in plunger molding. The operation, however, is more temperamental and causes a higher number of rejects. The savings in finish costs, however, often offset the slight additional waste.

Deflected gating

A recently developed design feature is termed "deflected gating." The thin hair of material passing through the small gate into a large cavity tends to cool beyond the point of good welding by the time the cavity is filled. By deflecting the stream against a wall, instead of directing it out into the cavity, the material immediately builds up a mass in which the two insulating walls and the basic flow pattern is set up. This is especially valuable in heavy, transparent moldings where weld lines are objectionable.

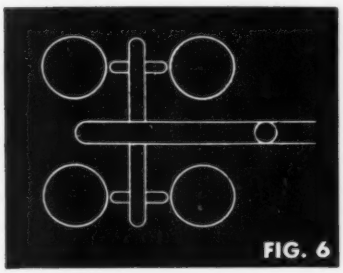

FIG. 6

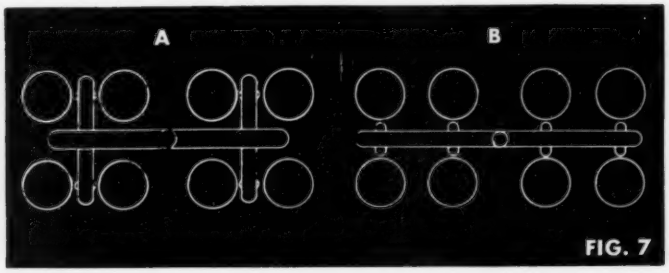

FIG. 7

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Stabilization of Polyvinyl Chloride

by R. E. LALLY† and F. R. HANSEN††

In the manufacture and use of articles made of polyvinyl chloride and its copolymers, it is necessary to protect the resin against the deteriorating effects of heat and light, since both act to produce discoloration, embrittlement, and general loss of desired physical properties. At one time it was felt that a pre-stabilized resin would answer the problem of stability; however, due to the many variations in compounding techniques and equipment, such an approach has not yet been found completely practical. Also the hope for a single stabilizer to answer all problems of the fabricator has been fading as the range of uses for articles manufactured of these resins has increased. Thus it is that the field of polyvinyl chloride stabilizers has developed to the point where it is now general practice to use a given stabilizer, or combination of stabilizers, to meet a specific set of conditions of manufacture or use.

THE structure of polyvinyl chloride is represented as a long chain, chlorinated hydrocarbon,

$$-CH_2-CHCl-CH_2-CHCl-CH_2-CHCl-$$

which is formed by the controlled polymerization of vinyl chloride ($CH_2=CHCl$) under proper conditions in the presence of catalysts. An example of a copolymer of vinyl chloride is the chloride-acetate; its structure may be shown as follows:

$$-CH(OCOCH_3)-CH_2-CH(Cl)-CH_2-CH(Cl)-CH_2-CH(Cl)-CH_2-$$

This copolymer is formed by the polymerization of a mixture of vinyl chloride and vinyl acetate.

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†Co-ordinator of plastic chemicals, Ferro Chemical Corp., Bedford, Ohio.
††Assistant director of organic research, Ferro Chemical Corp., Bedford, Ohio.

The physical properties of the vinyl resins may be varied over a wide range by controlling such factors as the degree of polymerization and the percentage admixtures of the chloride and acetate. However, such variations cause changes in the stability of the resulting resin; in general, the long chain (highly polymerized) resins possess better stability to heat and light. Unfortunately, however, if carried to too high a degree of polymerization, processing difficulties are encountered due to increased melting point and decreased solubility in plasticizers. Thus an intermediate degree of polymerization is generally used and, as a result, the resins require substantial stabilization against the effects of heat and light.

Degradation reactions

When the polyvinyl chloride or copolymer is subjected to heat or light, the following reactions may occur:

1) Heat alone or ultra-violet light may cause the formation of hydrogen chloride.

2) Free hydrogen chloride from decomposition may cause further breakdown by catalytic action.

3) Double bonds, formed by the liberation of hydrogen chloride, give weak points at which the long chains may break to form shorter chains:

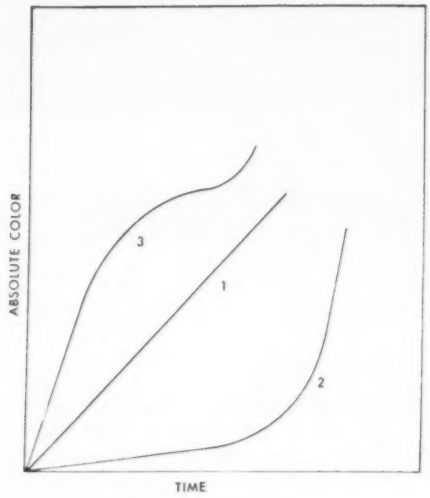
$$-CH_2-CHCl-CH=CH-CH_2-CHCl-$$

4) At the double bonds in the molecule, which may be chromophoric, oxidation may result in discoloration and embrittlement. This embrittlement is often the result of cross linkages.

5) Ultra-violet light may act on the double bond structure to accelerate embrittlement.

6) Free radicals may be formed, and they in turn may propagate chain reactions due to their high reactivity.

A stabilizer is any material which, when added to the resin, will prevent or counteract the activity of the liberated hydrogen chloride or prevent the



1—Three types of color development behavior in presence of stabilizers

reactions listed above. At present there is no one material that is entirely satisfactory for stabilization under all conditions.

Practically all stabilizers currently available on the market show both a heat and light stabilizing action but are generally classified as heat or light stabilizers depending on which action is most pronounced. To most processors of polyvinyl resins, heat stability is of immediate importance and, frequently, the end use of the vinyl articles does not require exceptional stability towards light. Because of this, the emphasis has been placed on the development of heat stabilizers, though several excellent light stabilizers are available.

Heat stabilizers

Heat stabilizers can be classified into several different types depending on the method by which they prevent or retard degradation of the vinyl polymer. One such important group is the metallic soaps. In part, these depend for their action on the way that they may react with hydrogen chloride, resulting in the formation of a harmless metal chloride and a weak organic acid.

Although the metallic cation of the soap is thought to play the major role in the stabilization of a vinyl, the anion or fatty acid portion of the soap is also important when water resistance, clarity, odor, and even stabilizing action are considered. As a general rule, the water resistance is lowered by the use of lower molecular weight acids such as butyric, propionic, etc. Soaps of 2-ethylhexoic acid tend to give translucent stocks while those of the cyclic naphthenic acids tend to give clear stocks. The effect of the anion on the stabilizing action of a soap can be exemplified quite well by the barium soaps of oleic, stearic, hydroxystearic, and ricinoleic acids. These are all 18-carbon, straight chain acids, the only difference being the presence or absence of a hydroxyl group and/or a double bond. The stearic acid has neither of these groups while the ricinoleic acid has both. Oleic acid has only the double bond and hydroxystearic acid has only the hydroxyl group. Of these four soaps, the barium ricinoleate quite consistently offers the best heat stability indicating that the hydroxyl group, along with a double bond, plays a part in the stabilization of a polyvinyl chloride.

Barium soaps.—The barium soap most used thus far is the ricinoleate. It gives very good heat stability in most of the commonly used resins and, when used alone, about 2 to 4% based on resin weight is required. If excessive amounts are used, a pink color may develop prematurely in the vinyl plastic on heating. However, barium ricinoleate is very rarely used alone, and one of the cadmium stabilizers is almost always used in conjunction with it. Barium ricinoleates currently range from fine powders to a granular, relatively dust free, friable form, the latter ordinarily being preferred. For those who prefer working with liquids, it is also available as a solution which yields vinyl stocks of improved clarity over the solid barium ricinoleates and of comparable stability.

Barium 2-ethylhexoate shows considerable promise as a heat stabilizer, and when properly used with one of the cadmium soaps it can give stocks that show very little, if any, yellowing after an exposure of 1 to 2 hr. at working temperatures. It has recently been released from the pilot plant stage and test run reports are favorable.

Strontium soaps.—The popularity of the strontium soaps has diminished somewhat with the advent of other improved stabilizers. However, they still have a place since they are fairly inexpensive, generally very compatible with the solvents and plasticizers used in organosols and plastisols, and offer some light stability. They appear to stabilize some colors quite well and when used with other stabilizers such as the lead or cadmium soaps, there is apparently a synergistic action between the two. They are sold as mobile liquid solutions, and when used alone in the amount of 2 to 5% they produce clear stock of fair heat stability.

Lead soaps.—Both neutral and basic lead soaps are used as stabilizers. The basic soaps are somewhat more popular and have the possibility of reacting with hydrogen chloride at the hydroxyl groups without liberating a fatty acid. The neutral and basic lead stearates are commonly used lead soaps, while the basic lead naphthenate is used to a small extent. The stearates usually contribute substantial

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plasticity and lubricity to the vinyl stock and are often used for this purpose as well as for their stabilizing action. They generally yield opaque stocks of good stability but are quite often used in conjunction with inorganic lead stabilizers.

Calcium soaps.—The ricinoleate and stearate are the calcium soaps most commonly used for stabilization, the stearate acting also to increase plasticity and lubricity. They tend to give good stability at about 300° F. for a period of time and then they allow the plastic to deteriorate rapidly exhibiting a stabilization curve characterized by Fig. 1, Curve 2. In some formulations, the stabilization period is too short to allow processing before the rapid breakdown period begins. With one of the more stable resins and a plasticizer such as diethylhexyl phthalate, (DOP), however, the calcium soap stabilizers can often do an adequate job.

The main advantage of calcium soaps over all the others is their very low degree of toxicity. When this is a major factor, it might be well to formulate around the nontoxic stabilizer rather than to find a nontoxic stabilizer for a particular formulation.

Tin soaps.—Tin stabilizers, such as dibutyl tin dilaurate, are soaps of dialkyl tin in which two of the valences of the tetravalent tin are satisfied by alkyl groups and the other two by organic acid groups. They may be formed by the reaction of a dialkyl tin oxide with an organic acid thus:

$$2\ RCOOH + R'_2SnO \longrightarrow (RCOO)_2SnR'_2 + H_2O$$

These stabilizers can react with hydrogen chloride to form the dialkyl tin dichloride and to liberate the organic acid. They are generally used in amounts of 2 to 4% based on resin weight, yielding stock of good heat stability. The dibutyl tin dilaurate is the most commonly used of this type of tin stabilizer. It tends, however to impart the odor of lauric acid to the finished stock, which in some cases is objectionable, and its cost is quite high, which generally prohibits its use in heavy vinyl sheeting such as is used in upholstering. There are other dibutyl tin soaps such as acetate and maleate. These tend to be better stabilizers on a weight basis but not necessarily on a tin content or cost basis. The acetate has the disadvantage of possessing a strong acetic acid odor, and both tend to give much more opacity to the vinyl than does the laurate.

Many other metallic soaps have been suggested as heat stabilizers for the vinyls, such as those of manganese, copper, etc., but due to reasons such as high cost or color of the cation itself, they have enjoyed very little, if any, commercial applications.

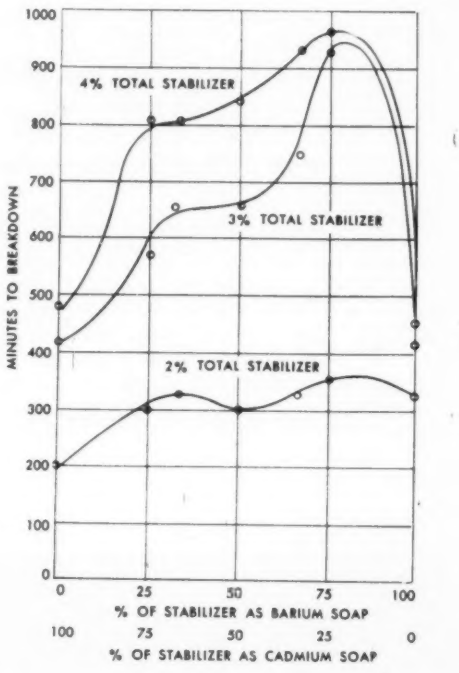
Inorganic compounds.—Another class of heat stabilizers consists of the inorganic metallic salts. These react with hydrogen chloride in various ways. In the case of neutral salts of weak acids such as calcium carbonate or silicate it appears the hydrogen chloride can react with the salt, liberating the weak acid and forming the metal chloride. In the case of basic salts of strong acids, such as basic lead sulfate, the free hydroxyl groups of the stabilizer are neutralized by the hydrogen chloride forming a lead sulfate and chloride and liberating water.

The most commonly used inorganic lead stabilizers are the basic sulfates, silicates, carbonates, phosphates and phosphites, the titanate and the oxide. Except for certain silicates, they give stocks of very high opacity and are used in the range of 2 to 25%, serving also as a pigment and filler in the higher ranges. They also give a degree of light stability, but this is probably due more to their pigmenting action than to their chemical activity.

Calcium carbonate and silicate are used as combination stabilizers, pigments, and fillers in amounts of 2% and higher. They are not nearly so effective as the basic lead salts in their heat stabilizing action, but they have the advantage of being nontoxic and are used where this is a factor.

Sodium silicates, phosphates, and borates give stocks of various degrees of opacity with both heat and light stability. Being water soluble, they tend to leach out, reducing the general water resistance of the plastic. Further, vinyl films containing them have a tendency to blush in moderately high relative

2—Synergistic effects of cadmium and barium stabilizers



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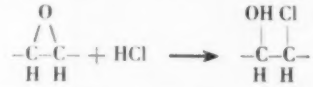
humidities. However, to offset these disadvantages, these compounds are relatively nontoxic and are employed where this is a factor.

The inorganic salts of many other metals have been suggested as stabilizers but as yet have not enjoyed wide usage. Among these are the salts of strontium, cadmium, barium, and antimony, the latter acting also as a pigment and a flameproofer in some cases.

Epoxy compounds.—Epoxy compounds are organic materials characterized by a cyclic structure of carbon atoms and one oxygen atom. In the stabilizers currently used, this is generally considered to be a three-membered ring with the oxygen bonded to two adjacent carbons which are part of a larger molecule. This epoxy group can react with hydrogen chloride to form a hydroxyl and a chloride group of relatively high stability, thus:



They are also thought to react with the double bonds remaining in the resin molecule after it has lost a hydrogen chloride molecule. In the case of a stabilizer molecule having two epoxy groups, this reaction may lead to a cross linkage between two resin molecules through the stabilizer molecule. This type of stabilizer is especially effective in some of the lower molecular weight resins such as are used in coatings and enamels. The epoxy stabilizers are pale yellow, resinous semi-solids or very viscous liquids. They are also offered in solution form for easier handling.

Amines.—The amines have been suggested and used to some extent as stabilizers, for they can combine with the hydrogen chloride to form the amine hydrochloride. However, many are so strongly basic that they may actually accelerate the removal of hydrogen chloride from the polyvinyl chloride. They also have a tendency to discolor and to regenerate on heating to temperatures above 300° F. any hydrogen chloride which they have absorbed. They are, therefore, very limited in their use.

Antioxidants.—The phenols, naphthols, etc., and their derivatives do not appear to be too widely used at present as stabilizers of polyvinyl chloride resins. Their main purpose is probably to prevent oxidation of the resin at the double bonds formed by the removal of hydrogen chloride and to inhibit the instigation or propagation of chain reactions. Since these antioxidants are not generally acceptors of hydrogen chloride from the polyvinyl chloride, they should be used in conjunction with such compounds.

Synergism

One of the most interesting phases of the problem of stabilization, especially heat stabilization, and probably the one offering the most possibilities, is that of the synergistic action of certain stabilizers when used with others. By using this action, it is quite often possible to obtain better all around stabilization using less stabilizer. It is not thoroughly understood as yet by what mechanism this synergism is brought about. One theory is that the two stabilizers have different rates or abilities to react with the hydrogen chloride. Thus, the more reactive of the stabilizers can take care of the peaks in hydrogen chloride liberation, leaving the less active one to perform over longer periods.

An example of this type of synergism is the system of barium soaps used in conjunction with cadmium soaps. This is shown in Fig. 2. These curves were obtained using Geon 101 with diethylhexyl phthalate. The samples, 80 mils thick, were heated at 300° F. until they reached a certain color (in this case color 12 on the Gardner color scale) designated as "breakdown". From these curves it can be seen that, by careful choice of a ratio of barium to cadmium, optimum results may be obtained using a minimum of stabilizer. The flatness of the curve at 2% total stabilizer is probably due to the fact that it is approaching the straight line curve representing the inherent stability of the resin itself.

Other factors such as light stability must be considered in making the choice of a ratio. It is possible that the ratio which gives the best heat stability will not give the desired light stability. In this event it might be advisable, for example, to increase the total stabilizer and to shift the ratio in favor of higher cadmium content. The number of possibilities of synergistic action in stabilizer combinations is infinite and, if properly applied, can prove of great value.

Light stabilizers

Most all of the heat stabilizers so far discussed impart a measure of light stability; however, those which are used as, and generally considered to be, light stabilizers are discussed here briefly.

Cadmium soaps.—Cadmium naphthenate, ricinoleate, 2-ethylhexoate, and stearate are very good light stabilizers for most resins. These soaps are offered on the market as solids or solutions in various organic solvents and of various cadmium contents. The degree of stability imparted is almost proportional to the amount of cadmium contained in the resin. When an excess of cadmium stabilizers are used, there is a tendency for the plastic to darken prematurely to a purplish brown on exposure to heat.

Phosphates.—The alkali phosphates and alkali alkyl phosphates and polyphosphates are widely used as light stabilizers in vinyl formulations for such uses as window shades, curtains, seat cover

(*Please turn to page* 156)

Nitrile Rubbers as Plasticizers in Vinyl Resins*

by M. C. REED†

PLASTICIZERS serve two primary functions in vinyl resins. One effect is to reduce the melt viscosity of the resin so that it can be fluxed and formed by calendering, extrusion, or molding. The more obvious effect, at least so far as the user is concerned, is to reduce the stiffness or to make the compound more pliable. A wide variety of materials have been used as plasticizers. Among these are monomeric esters, nitriles, ketones, hydrocarbons, and chlorinated hydrocarbons.

However, one of the principal shortcomings of most plasticizers is the ease with which at least a small part of the plasticizer may be removed from the plastic, either as volatile loss, or extracted by solvents, fats, oils, or water. Plasticizer loss results in stiffening of the plastic, and in some cases in marring of surface coatings.

One solution to these difficulties is the employment of high-molecular-weight polyesters. Another approach has been the use of acrylonitrile-butadiene copolymers called nitrile rubbers. These materials are high enough in molecular weight to be completely nonvolatile. They are also, for all practical purposes, nonextractible in fats and oils. The permanence of nitrile rubbers has made them of especial interest in food packaging applications. The most familiar of these uses is the oleomargarine bag which permits coloring the oleomargarine by kneading the bag without the use of utensils. Other applications in which complete absence of migration is desirable are being investigated.

Properties of vinyl-nitrile rubber blends

The vinyl resins used in this work include polyvinyl chloride and vinyl chloride-acetate resins having a vinyl chloride content of 90 to 98 percent. These are representative of the type commonly used in elastomeric products. Several types of nitrile rubbers were tested. These included the commercial products sold under the trade names of Chemigum, Hycar, and Paracril (formerly Perbunan).

Nitrile rubbers appear to plasticize vinyl resins by a solvation mechanism, that is, in the same manner as the usual monomeric ester type plasticizers. When powdered vinyl resin is added to nitrile rubber on a cold roll mill it disperses as any other filler, yielding a soft opaque batch with poor strength. When the batch is then hot milled, it becomes clear and behaves as a normal plasticized compound.

Nitrile rubbers are vulcanizable either alone or in vinyl resin blends. When the amount of nitrile rubber in the compound exceeds the vinyl resin, vulcanization is usually desirable, particularly when a relatively minor amount of resin is used to stiffen and improve weathering properties of nitrile rubber compounds.

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The plasticizing efficiency of nitrile rubbers is lower than most of the monomeric ester plasticizers, being more comparable to the viscous polyesters of high molecular weight. Because of this, nitrile rubbers appear best suited to those products having high or medium stiffness.

While vinyl resin-nitrile rubber compounds stiffen more on cooling than most commercial vinyl compounds, they have brittle temperatures adequate for many applications. The brittle temperature of a specific compound appears to be dependent on pro-

(*Please turn to page* 162)

*An abstract of a lecture presented at the Polymer Group of the North Jersey Section of the American Chemical Society at the Esso Research Center.

† Development Laboratories, Bakelite Corp., Bound Brook, N. J.

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Materials

COPOLYMERS OF VINYL COMPOUNDS AND MALEIC ANHYDRIDE. R. B. Seymour, F. F. Harris, Jr., and I. Branum, Jr. Ind. Eng. Chem. *41*, 1509-13 (July 1949). Copolymers of maleic anhydride with styrene, α-methylstyrene, α,β-dimethylstyrene, vinyl acetate, methyl acrylate, methyl methacrylate, acrylic acid, ethyl vinyl ether, isopropyl vinyl ether, and ethyl hexyl vinyl ether were prepared using mass and solution techniques. Copolymers of maleic anhydride with vinyl acetate, methacrylic acid, ethyl vinyl ether, and isopropyl vinyl ether were soluble in water but the addition of alkali was necessary to obtain solubility of the other copolymers. The solubility of the heavy metal salts was a function of the original solubility. Compositions which produced insoluble films were obtained by the reaction of these copolymers with ethylene oxide.

POLYPHENYL. G. Goldfinger. J. Polymer Sci. *4*, 93-6 (Feb. 1949). A polymer consisting probably of phenyl and quinoid groups linked in a para position, having a degree of polymerization of about 34 six-membered carbon rings, was obtained. Further work is being carried out on this polymer by varying the method of dehalogenation, the reaction temperature, and the concentration. Attempts are also under way to synthesize by this method other polymers, such as polyethylene, head-to-head, tail-to-tail polystyrene, and a carbon chain containing alternating single and double bonds. There are indications that it will thus be possible to obtain a series of new polymers.

ETHOXYLINES—A NEW GROUP OF TRIPLE-FUNCTION RESINS. E. Preiswerk and C. Meyerhans. Elec. Manuf. *44*, 78-81, 164, 166 (July 1949). The properties of some ethoxyline resins are described. These resins are used as coatings, potting compounds, and adhesives. They are easily handled, have remarkable adhesion to many types of materials and shrink very little on setting. They are cured to a thermosetting, insoluble material by heat.

Properties

SOME STUDIES OF PLASTICIZED POLYVINYL CHLORIDE. T. Alfrey, N. Wiederhorn, R. Stein, and A. Tobolsky. J. Polymer Sci. *4*, 211-27 (June 1949). The nature of the gel structure of polyvinyl chloride systems was studied with the aid of numerous experimental techniques. The results of this work confirm the existence of a 3-dimensional network system in plasticized polyvinyl chloride and polyvinyl chloride-acetate (VYNW) compositions and a fairly definite picture of its details. It is established on the basis of creep, stress relaxation, dilatometry, birefringence, and X-ray measurements, that these materials are partially crystalline in nature. The relative amounts of crystalline and amorphous polymer in any one composition is not established, but there is no doubt that the crystalline regions comprise but a small fraction of the total composition.

FLOW PROPERTIES OF PHENOLIC RESINS. G. J. Dienes. J. Colloid Sci. *4*, 257-64 (June 1949). The parallel plate plastometer method of determining high viscosities was extended to novolac type phenol-formaldehyde resins. The deformation-time behavior of these materials is contrasted with that of thermoplastic viscoelastic substances. The phenolic resins are shown to be simple Newtonian liquids of high viscosity even at high rates of shear. No complicating elastic effects were observed. The viscosities of these resins are highly temperature sensitive with an activation energy of viscous flow in the 50-70 Kcal./mol range.

PROPOSED NOMENCLATURE FOR ELASTIC AND INELASTIC BEHAVIOR OF HIGH POLYMERS. H. Leaderman. J. Colloid Sci. *4*, 193-210 (June 1949). Certain general aspects of the mechanical properties of high polymers are summarized and a nomenclature for the observable phenomena is proposed. This nomenclature is consistent with present usage as nearly as possible.

EVALUATION OF THE DIFFUSION COEFFICIENT FOR CHLOROFORM IN POLYSTYRENE FROM SIMPLE ABSORPTION EXPERIMENTS. J. Crank and G. S. Park. Trans. Faraday Soc. *45*, 240-9 (1949). Pieces of polystyrene were suspended in atmospheres containing various partial pressures of chloroform at 25° C. The diffusion of the chloroform in the polystyrene is a rate-controlling process. The diffusion coefficient varies considerably with the concentration of the chloroform.

Coatings

EVALUATION OF PAINT FILMS. C. J. Rolle and T. L. Dietrich. Analytical Chem. *21*, 996-7 (Aug. 1949). A method is presented for resolving the stripping force measurements of organic coatings on metal surfaces into their basic factors of plasticity and adhesion. The application of this method should make the adherometer a useful research tool in the evaluation and formulation of organic finishes.

AQUEOUS ZEIN DISPERSIONS. C. W. Ofelt and C. D. Evans. Ind. Eng. Chem. *41*, 830-3 (Apr. 1949). Zein is dispersible in strong alkali metal hydroxides only within the narrow pH range 11.3 to 12.7. Quaternary ammonium hydroxides are also dispersing agents but somewhat inferior to the alkali metal hydroxides. Zein is not dispersible in ammonium hydroxide or in calcium hydroxide solutions. The amount of alkali required to disperse zein is low; based on the weight of zein, 1.4% (minimum) to 6.4% (maximum) of sodium hydroxide is required for the preparation of a 10% zein dispersion. The dispersibility of zein is attributed to the formation of the alkali salts of the phenolic-hydroxyl groups of

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tyrosine. Zein is dispersible also in strong acids (12 N hydrochloric). The pH dispersion curves, viscosity curves, and the stability data are presented for aqueous alkali-zein dispersions.

Molding and Fabricating

BEADING OF PLASTIC SHEET. E. Ronda. Modern Packaging *22*, 128-30 (Feb. 1949). Factors involved in the fabrication of containers from plastic sheet are discussed. Methods of forming and design features are considered.

TESTING AND PROVING INJECTION MOLDS PRIOR TO PRODUCTION. W. M. Halliday. Plastics (London) *13*, 269-73, 330-2 (May, June 1949). Techniques for testing injection molds are described. Remedies for faults discovered are also considered.

Testing

A METHOD FOR DETERMINING THE EXTENT OF POLYMERIZATION OF ACRYLIC RESINS AND ITS APPLICATIONS FOR DENTURES. H. J. Caul and I. C. Schoonover. J. Am. Dental Assoc. *39*, 1-9 (July 1949). A chemical method was developed to determine the completeness of polymerization of cured acrylic resin. The method is based on a determination of number average molecular weight or of the number of double bonds. Number average molecular weight may be used to correlate some of the chemical and physical properties with conditions of cure (time, temperature and presence of impurities). The method is applicable to the investigation of irregularly shaped specimens which cannot be tested by conventional methods, and is useful in evaluating the uniformity of a manufacturer's product. Data were obtained which indicate that the lower transverse strength of thin sections of dentures as compared with thick sections is the result of less complete polymerization in the thin sections. The low transverse strength of specimens cured at 75° C. for 2½ hr. appears to be the result of incomplete polymerization. Specimens polymerized at 100° C. for 45 min. are stronger. Impurities introduced into resins processed against some brands of rubber dam prevent complete curing of the resin. The number average molecular weights of several different brands of acrylic powder prior to curing vary between 3500 and 36,000; after curing in accordance with the manufacturers' recommendations, they vary from 8000 to 39,000.

SHOCK RESISTANCE OF MOLDED THERMOSETTING PLASTICS MATERIALS. Elec. Manuf. *44*, 80-5, 170, 172, 174 (Aug. 1949). A machine for determining the shock resistance of lightweight equipment is described. This apparatus was used to determine the flexural, tensile and shear high-impact shock resistance of various types of thermosetting plastics. These dynamic test methods can be used to differentiate among various materials. The shock effect is simulative of the type of shock encountered in service. The data obtained may be used as design criteria in the manufacture of parts which will be subjected to high-impact shock.

METHOD FOR WEIGHT LOSS OF PLASTIC FILMS AND SHEETS ON HEATING. M. E. Marks. A.S.T.M. Bulletin No. 159, 53-5 (July 1949). An apparatus for determining the weight loss on heating of a large number of plastic specimens at one time is described. The flow of clean, dry, preheated air can be controlled over a wide range. The equipment is easy to use and inexpensive to make.

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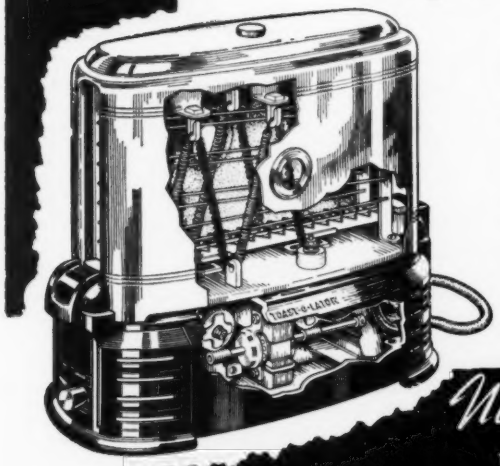

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U.S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

POLYVINYL FLUORIDE. F. L. Johnston and H. J. Richter (to Du Pont). U. S. 2,476,606, July 19. Polyvinyl fluoride thermally stabilized with glycerol monolaurate.

CLOSURE. J. G. Rote, Jr. (to Sun Chemical). U. S. 2,476,627, July 19. Coating a paper base with a continuous layer of a vinyl-acrylic copolymer, a phthalic acid ester, and applying a top coating of polyethylene, and a urea-formaldehyde resin.

MOLD. J. Schumann. U. S. 2,476,631, July 19. A casting mold comprising a layer of latex and a superposed stiffened layer of paraffin.

RESIN. C. D. Ender (to Hercules). U. S. 2,476,714, July 19. Reaction product of a dihydric alcohol, an α, β-unsaturated dicarboxylic acid, phthalic acid, and a monohydric alcohol ester of a rosin acid.

POLYMERS. E. A. Kern and R. K. Abbott, Jr. (to G.E.). U. S. 2,476,737, July 19. Polymers and copolymers of 2-vinyl fluorene.

RESIN STABILIZER. C. D. Le Claire (to Firestone). U. S. 2,476,829, July 19. Chlorine-containing resins stabilized with a diacetyl monoxime derivative.

FILAMENTS. G. A. Spencer (to Firestone). U. S. 2,476,830, July 19. Drawing filaments of polymers and copolymers of vinylidene chloride from rods thereof.

VINYL CHLORIDE RESINS. R. A. Donia (to Firestone). U. S. 2,476,832, July 19. Polymers and copolymers of vinyl chloride containing imidazolidines.

UREA RESINS. H. A. Scholz and J. K. Wise (to U. S. Gypsum). U. S. 2,476,919, July 19. Coating or adhesive consisting of urea-formaldehyde condensate and anhydrated alkaline earth oxide reactive therewith to insolubilize the condensate.

GLYCIDYL ALLYL PHTHALATE. E. C. Shokal, L. N. Whitehill, and C. V. Wittenwyler (to Shell). U. S. 2,476,922, July 19. A polymeric mixed ester of glycidyl allyl phthalate.

ALLYL ESTER POLYMERS. R. Whetstone (to Shell). U. S. 2,476,936, July 19. Polymerizing an ester of a β, γ-mono-olefinic monohydric primary alcohol and a saturated monocarboxylic acid by heating in the presence of a nickel salt of a monocarboxylic acid.

MELAMINE RESINS. J. K. Wise (to U. S. Gypsum). U. S. 2,476,939, July 19. Melamine-formaldehyde condensate mixed with anhydrated alkaline earth oxide reactive therewith to insolubilize the condensate.

COPOLYMERS. E. L. Fiedler (to Dow). U. S. 2,476,967, July 26. Copolymers of styrene, butadiene, and vinylidene chloride which may be cast from aqueous dispersion as a film on wood.

POLYMERS. J. W. Fisher (to Celanese). U. S. 2,476,968, July 26. Melt spinning of poly-1,2,4-triazoles in an atmosphere of saturated steam.

KNIFE HANDLES. M. A. Mirando (to Imperial Knife). U. S. 2,476,995, July 26. Method of molding knife handles.

MOLDING POWDERS. J. Sandler (to Hungerford Plastics). U. S. 2,477,009, July 26. Preparation of molding powder by tumbling in the presence of a fluid conditioning material.

SEWING MACHINE. G. H. Brown and R. A. Bierwirth (to R. C. A.) U. S. 2,477,040, July 26. Sewing machine for bonding thermoplastic material by means of a high frequency heated needle.

EXTRUSION. N. O. Broderson and E. C. Broderson (to Rochester Button). U. S. 2,477,170, July 26. Process and apparatus for making variegated plastic articles.

PLYWOOD TUBING. C. B. Hemming (to U. S. Plywood). U. S. 2,477,190, July 26. Means for molding plywood tubing with an inflatable mandrel.

SEALING. T. H. Story (to R. C. A.). U. S. 2,477,214, July 26. Electrode for high frequency sealing of thermoplastic sheet.

VINYL ETHERS. H. T. Thompson (to General Aniline). U. S. 2,477,218, July 26. Polymers of vinyl ethers.

VINYL ETHERS. A. O. Zoss (to General Aniline). U. S. 2,477,225, July 26. Vinyl alkyl ether polymers stabilized by dispersing finely divided sulfur in the monomer and polymerizing.

MOLDING POWDER. J. Sandler (to Hungerford Plastics). U. S. 2,477,269, July 26. Apparatus for manufacture of plastic molding powder.

POLYMERS. E. M. Filachione and C. H. Fisher (to U. S.). U. S. 2,477,293, July 26. Polymers of o-allylphenyl acrylate.

JOINING MEANS. J. C. Quayle and P. Jones (to British Insulated Callenders' Cables). U. S. 2,477,313, July 26. Machine for joining thermoplastic material by means of a high frequency field.

THERMOPLASTIC. W. J. Sparks, A. H. Gleason, and P. K. Frohlich (to Jasco). U. S. 2,477,316, July 26. A mixture of polyisobutylene and an emulsion copolymer of styrene and a conjugated diolefin.

PHENOLIC CONDENSATE. H. M. Day (to American Cyanamid). U. S. 2,477,328, July 26. Cation exchange resin prepared by reacting phenol, formaldehyde, and an alkaline water-soluble salt of sulfurous acid.

VINYL RESIN. W. R. Richard (to Monsanto). U. S. 2,477,349, July 26. Vinylidene halide resin stabilized with triethyl lead hexyl maleate and dibutyl diphenyl tin.

MOLDING. J. A. Gits. U. S. 2,477,368, July 26. Apparatus for injection molding.

REINFORCED PLASTICS. J. A. Grant and D. E. Babcock (to Owens-Corning Fiberglas). U. S. 2,477,407, July 26. Coating a fabric having glass fibers with dilute

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aqueous solution of gelatin and formaldehyde, heating, coating with phenol-formaldehyde, assembling with a similarly coated assembly and curing the resulting laminate.

COLOR FORMERS. D. M. McQueen (to Du Pont). U. S. 2,477,462, July 26. Polymeric color formers from hydroxyl polymers containing reactive ketaldone groups with reactive methylene and amino color groups.

TRANSPARENCY MOUNT. J. N. Williams. U. S. 2,477,470, July 26. A transparency mount comprising a frame of molded thermoplastic material.

CONDENSATE. H. Wittcoff (to General Mills). U. S. 2,477,551-2, July 26. Method of separating impurities from polyhydroxy condensates.

COPOLYMERS. C. R. Irons and C. B. Havens (to Dow). U. S. 2,477,608-9-10-11-12-13-14, Aug. 2. Copolymers of vinylidene chloride with 3-(2-xenoxy)-1,2-epoxy propane, ethyl phthalyl ethyl glycolate, and 4'-*tert*-butyl phenyl salicylate, plasticizers, and other modifiers.

RESINOUS COMPOSITIONS. F. J. Nagel (to Westinghouse). U. S. 2,477,641, Aug. 2. The resinous reaction product of anhydrous polyhydroxy benzene substituted in 2,4,6 positions and an anhydrous aldehyde in an anhydrous solvent.

CONDENSATES. A. L. Rummelsburg (to Hercules). U. S. 2,477,654-5, Aug. 2. Condensate of rosin with an unsaturated acyclic hydrocarbon capable of polymerization to a hemicolloid or with an unsaturated heterocyclic compound.

COPOLYMERS. H. L. Schaefer and C. B. Havens (to Dow). U. S. 2,477,656-7-8-9, Aug. 2. Copolymers of vinylidene chloride.

PLIERS. W. Feinbloom. U. S. 2,477,689, Aug. 2. Pliers for forming plastic contact lenses.

VINYL RESINS. P. L. Brandt (to Pan American Refining). U. S. 2,477,717, Aug. 2. Vinyl resins plasticized with a polyalkyl-naphthalene.

POLYMERIZATION. E. C. Britton and W. J. LeFebre (to Dow). U. S. 2,477,784, Aug. 2. Aqueous emulsion polymerization of vinyl aromatic compounds in the presence of a chromium compound.

STRUCTURAL PANEL. C. E. Bacon (to Owens-Corning Fiberglas). U. S. 2,477,852, Aug. 2. Resin-bonded glass fiber structure comprising sheets bonded to resin-bonded core members.

MOLDING. E. E. Novotny (to Borden Co.). U. S. 2,478,-005, Aug. 2. Apparatus for formation of molded thermoplastic and thermosetting materials.

PLASTIC PREPARATION. F. M. Roddy. U. S. 2,478,013, Aug. 2. Preheating plastic to a workable state for fabrication prior to molding.

POLYMERS. J. B. Rust and W. B. Canfield (to Montclair Research). U. S. 2,478,015, Aug. 2. An unsaturated liquid ester capable of curing under heat comprising the reaction product of pentaerythritol with a β-unsaturated monohydric alcohol monoester of a dicarboxylic acid.

POLYMERS. W. J. Burke (to Du Pont). U. S. 2,478,038, Aug. 2. β-substituted ethyl-mercapto polymers and process for preparing.

OLEFIN POLYMERS. A. J. van Paski (to Shell Devel-

(*Please turn to page* 127)

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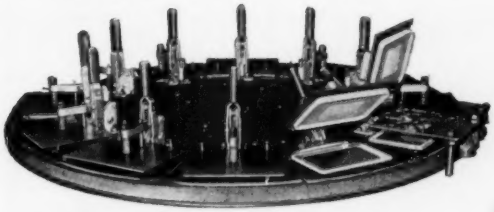

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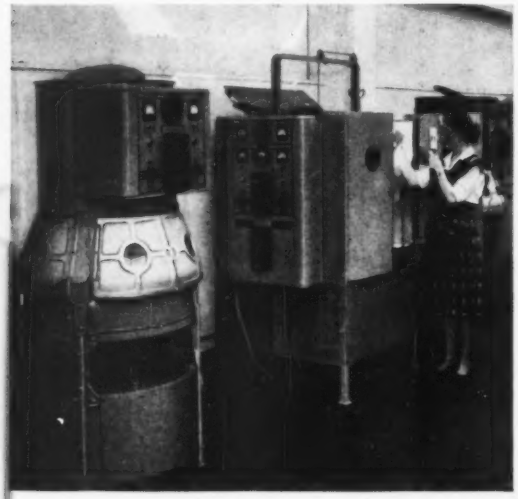

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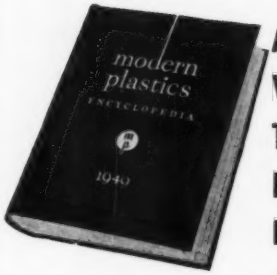

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opment). U. S. 2,478,066, Aug. 2. Polymerization of olefins in the presence of nitrogen compounds.

HEAT SEALING. H. G. Morner. U. S. 2,478,121, Aug. 2. Heat-sealing thermoplastic sheets.

POLYMERS. T. W. Evans (to Shell Development). U. S. 2,478,154, Aug. 2. A homopolymer prepared by heating methacrolein diacetate with benzoyl peroxide.

MOLDING. H. W. Collins (to Owens-Corning Fiberglas). U. S. 2,478,165, Aug. 2. Low pressure molding apparatus for sheet material.

BATTERY SEPARATOR. L. S. Gerber. U. S. 2,478,186, Aug. 9. A separator for the plates of a storage battery comprising glass fiber sheets laminated with a phenolic resin.

FORMING PLASTIC. G. A. Lyon. U. S. 2,478,199, Aug. 9. Method and apparatus for extrusion forming of plastic articles.

RESIN DISPERSIONS. K. L. Berry (to Du Pont). U. S. 2,478,229, Aug. 9. Method for forming concentrated aqueous dispersions of polytetrafluoroethylene.

COMPOSITE ARTICLES. W. R. Hickler (to Goodrich). U. S. 2,478,267, Aug. 9. Manufacture of tubular elements comprising a fabric base, an elastomer, and a thermosetting plastic molded in composite relationship.

PAPER CLIP. J. de Swart (to Shellmar). U. S. 2,478,376, Aug. 9. A plastic paper clip.

POLYMERS. J. B. Dickey (to Eastman). U. S. 2,478,378, Aug. 9. Polymers of N-acrylaminoalkylacrylamide compounds.

CELLULOSE ESTERS. C. R. Fordyce and C. L. Crane (to Eastman). U. S. 2,478,383, Aug. 9. Method for continuous esterification of cellulose.

POLYMERIZATION. W. E. Hanford and R. M. Joyce, Jr. (to Du Pont). U. S. 2,478,390, Aug. 9. Polymerization of mono-olefinic hydrocarbons in the presence of saturated aliphatic esters of oxy acids.

CROTYL METHACRYLATE. H. C. Miller (to Du Pont). U. S. 2,478,416, Aug. 9. Polymerizing crotyl methacrylate in aqueous emulsion in the presence of a water-soluble persulfate and a water-soluble sulfoxide.

POLYVINYL ALCOHOL. G. S. Stamatoff (to Du Pont). U. S. 2,478,431, Aug. 9. Heating methanol and sulfuric acid, adding polyvinyl acetate, and heating until reaction is complete.

VINYL ESTERS. R. H. Wiley (to Du Pont). U. S. 2,478,441, Aug. 9. Polymers of vinyl diethylphosphoroacetate.

RESINS. W. Krumbhaar. U. S. 2,478,490, Aug. 9. Method of preparing rosin-modified phenol-formaldehyde resins of enlarged molecular size.

POLYMERS. C. S. Marvel (to Du Pont). U. S. 2,478,495, Aug. 9. An interpolymer of vinyl benzylidene diacetate and vinyl acetate.

COPOLYMERS. G. E. Ham (to Monsanto). U. S. 2,478,627, Aug. 9. A copolymer of vinyl acetate, vinyl benzoate, and an alkyl acrylate.

MOLDING POWDER. J. H. Lum (to Monsanto). U. S. 2,478,634, Aug. 9. A molding powder of phenol-acetaldehyde resin and Manilkara woodflour.

MOLDING. E. W. Halbach (to Bolta). U. S. 2,478,823, Aug. 9. Injection molding apparatus.

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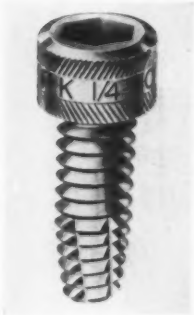
NEW MACHINERY AND EQUIPMENT

Self-tapping screw—Speed and economy through elimination of tapping operations are the major objectives of a new fastener, the Self-tapping Socket Head Cap Screw, developed by Parker-Kalon Corp., 200 Varick St., New York 14, N. Y. The new device embodies the features of the Size-Marked Socket Head, common to the standard P-K Cap Screw, and the thread body of the regular P-K Type "F" Self-tapping Screw which cuts a thread in a plain drilled hole in metals or plastics, as the screw is turned in.



Particularly satisfactory for many Socket Screw applications which do not require excessively high stress concentrations, the device, when used in assemblies where other fasteners are standard socket head screws, needs only the standard key wrench for fastening.

Parker-Kalon points out that the screws can be easily removed and replaced in the same hole many times without substantially reducing their holding power.

Combination slitter, layer, rewinder—The trifold action of slitting, rotary laying, and rewinding is accomplished by a combination unit currently being marketed by Center Tool and Manufacturing Co., 2706 W. Van Buren St., Chicago 12, Ill. The manufacturer claims the equipment will slit 108 rolls of binding from a 54-in. web, and will also process plastic binding tape from ½-in. wide and up by 400 yds. long in less than 4 min. exclusive of setting up time. The unit, available in sizes from 36 to 72 in., also has additional features similar to those of the Standard Rotary Laying and Rewind Machine which is said to be especially suitable for fabricating plastic table cloths, shower and window curtains, and drape and pattern sheets.

Collet chuck—Aimed at machining operations requiring severe types of drilling, tapping, and milling is the new heavy duty "Controlled-Air-Power" Collet Chuck, the BZC-10, recently introduced by The Bellows Co., 222 W. Market St., Akron 9, Ohio. Capable of exerting a gripping power of approximately 185 ft. lb. torque with an air line pressure of 60 lb., the BZC-10 will handle almost any standard collet with stock clearance up to 1⅜ inches. An adaptor unit, provided with the chuck, permits application to practically any standard externally threaded draw type collet.

A major feature of the BZC-10 is the "dead man" safety control designed as protection against air pressure failure. In such an eventuality, the unit will maintain a secure hold and will not release its grip until air pressure is applied. The chuck, which can be mounted in any position, is powered by a Bellows BM-10 Air Motor which develops a thrust 10 times the operating air line pressure.

Pneumatic grinder—To facilitate grinding operations in close quarters, or in situations where intricate designs permit only the use of very small grinding wheels, a 15-oz. pneumatic grinder for use with grinding wheels of ½-in. diameter or smaller has been developed by the Keller Tool Co., 4700 Hall St., Grand Haven, Mich. Known as the 30A7, the device is equally adaptable to touching up dies and related general tool-room functions. Offering a speed of 75,000 r.p.m., the grinder is conveniently controlled by an inverted throttle lever. Mounted grinding wheels with ⅛ in. diameter shanks may be accommodated in the standard spindle collet. Also available are spindles with chucks of 3/16 or ¼ in. capacity.

Magnetic grate—Foreign elements, potentially injurious to chemicals and related viscous materials, can be intercepted by the new and different permanent magnetic separator—announced by The Bauer Bros. Co., 1773 Sheridan Ave., Springfield, Ohio—which features a grate construction with magnetized Alnico bars and iron spacers. Of particular importance is the fact that the grates can be installed at the base of hopper, bin, or floor opening at a point prior to the entry into processing equipment of the material to be protected.

Wire grids accompanying the unit not only receive ferrous pieces and particles attracted by the grate, but also remove other large debris such as strings, paper, sticks, stones, and straws. Made to fit all sizes of openings upwards from 8 sq. in., the grate has an approximate weight per sq. ft. of 15 pounds.

Swivel and rotating joints—Two additions to its line of joints have been announced by Chiksan Co., 332 Pomona Ave., Brea, Calif. A high temperature swivel joint has been developed featuring a metallic seal said to be fully effective in both constant and intermittent service. Available in eight different styles, each capable of turning a full 360°, the swivels are built to operate at temperatures up to 600° F. and maximum working pressures of 300 p.s.i.

Turning facility is said to eliminate strain on pipe and fittings and to assist in absorbing vibration. Variety of styles, each capable of rotating in one, two, and three planes, makes possible lines with wide flexibility.

Adaptable to many industrial tasks is the high temperature rotating joint designed for operation with hot or cold rolls, platens, tumblers, mixing equipment, etc. The joint may be obtained in sizes of 1, 1½, and 2 inches. The unit will efficiently handle hot or cold liquids, gases, and vapors. Features include: easy turning on stainless steel balls; durability and corrosion resistance; carefully gaged pipe threading; and rotation with low torque.

Direct flow pumps—Low maintenance and easy accessability are the principal features of a series of 5-in. stroke direct flow pumps announced by The Aldrich Pump Co., 6 Gordon St., Allentown, Pa. Included in the series is a three-cylinder Triplex pump, a Quintuplex with five cylinders, a seven-cylinder Septuplex, and a Nonuplex with nine cylinders. Featured in the line of pumps is the construction of the fluid-end in which the stuffing boxes are located at the top of the pump. Elements of the design are said to assure minimum replacement cost and time requirements when corrosive liquids are being handled. Other highlights are: two fluid-end sizes permitting use of plungers ranging from

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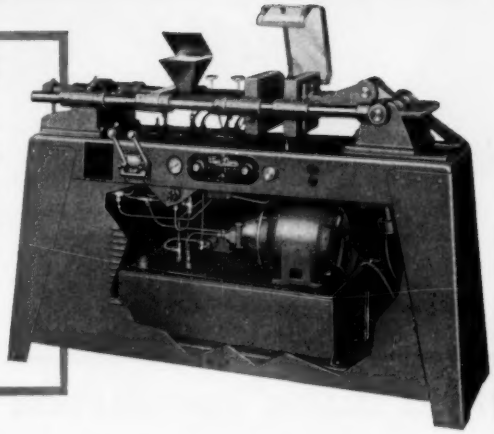

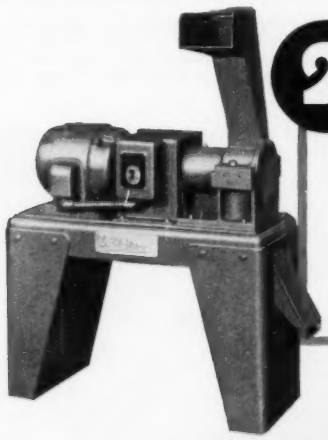

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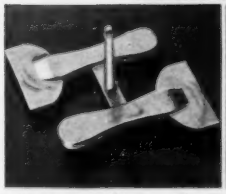
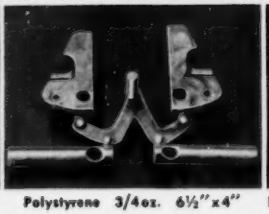
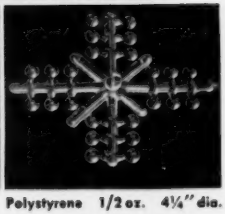


Polystyrene 4/5 oz. 4" x 4"



Polystyrene 3/4 oz. 6½" x 4"



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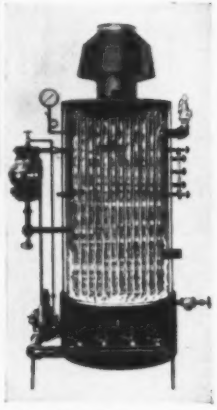

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1¾ to 3½ in. in diameter, and drive by either internal combustion or steam engine, electric motor, or steam turbine.

Impulse heater—Adaptable for heat sealing polyethylene and other plastic film is a new, low voltage, transformer operated, impulse type sealing machine developed by Vertrod Corp., 17 Williams Ave., Brooklyn 7, N. Y. The equipment is a jaw type unit, with the upper jaw heat insulated with a buffer. Mounted on the lower jaw is a .002-in. strip of nichrome which can vary in width from 1/10 to one inch, and which is electrically insulated from the lower jaw by a silicone impregnated Fiberglas tape.

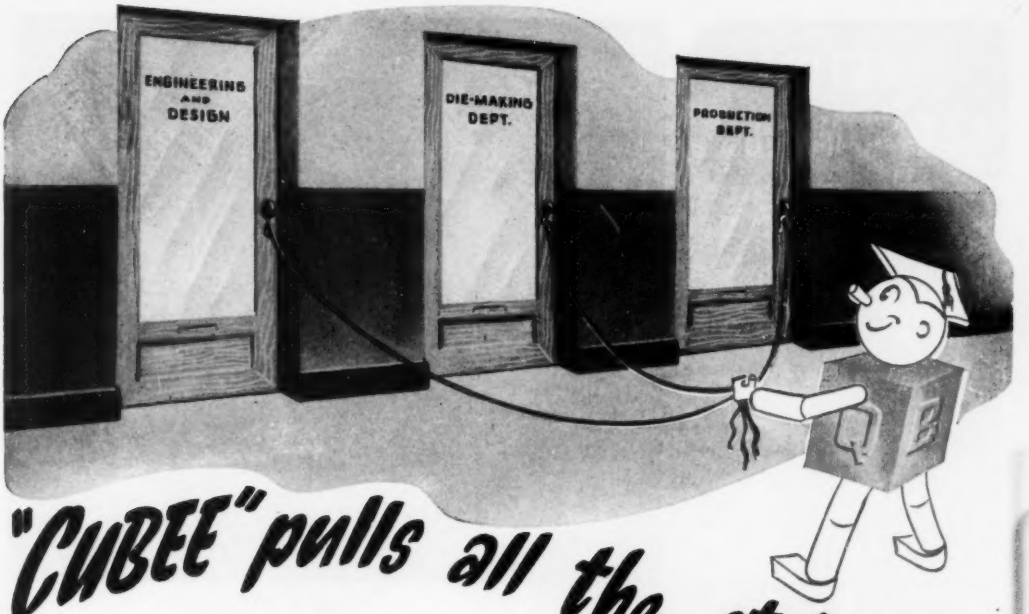
In operation, the film to be heat sealed is inserted between the jaws which are clamped with pressure. At the instant of clamping, a Micro-switch closes the circuit between the nichrome strip and the transformer secondary. The heating cycle is very short—about one second for the over-all heat and set cycle—and is controlled automatically. A wide variety of welds can be produced by the machine according to the needs of the operator. Bars from 6 to 24 in. long can be provided for either hand- or foot-operated units.

Plastic welder-sealer—A wide variety of welding and sealing operations on plastics may be performed on the Hot Jet flameless, electrically heated torch recently introduced by DeBell & Richardson, Inc., Hazardville, Conn. Designed as a compact, efficient, easily handled unit, the heater can be adapted to heating, melting, sealing, or welding such plastics as polyethylene, nylon, and polyvinyl chloride.

Essentially, the torch is a source of high temperature gaseous heat without flame, delivering air or gas at any controlled temperature up to 700° F. and at pressures

from 5 to 40 p.s.i. Built for continuous operation, the Hot Jet can be fitted into machinery requiring spot heat sources, and may also be applied for brazing with adhesives and to provide a shielding atmosphere.

Electrical power is regulated by a control panel on which is mounted a Superior Electric Powerstat rated at 7½ amps., 115 volts, 60 cycles a.c. Also on the panel is the Cash Standard pressure reducing valve for adjustment of air or gas pressure. Both torch and panel are carried in a strong, steel carrying case equipped with holders for the power and air controls, weighing a total of 30 pounds.



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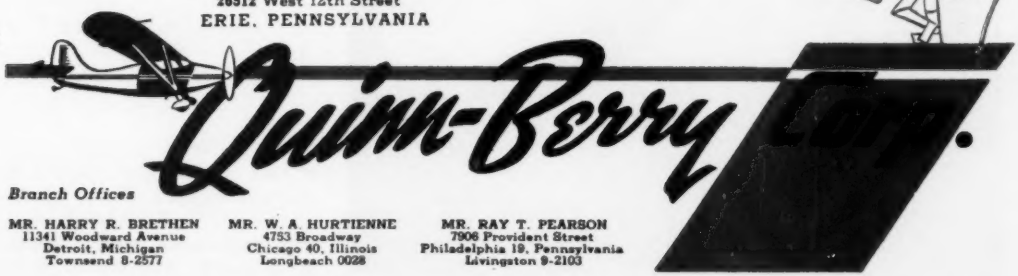

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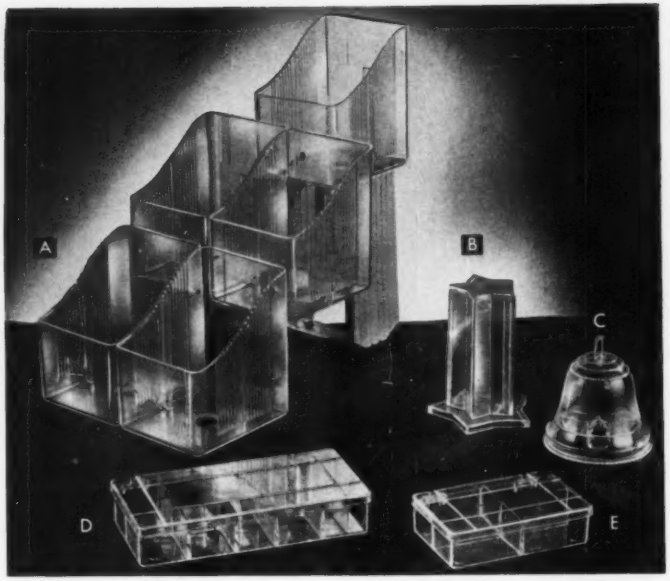
PLASTICS STOCK MOLDS*

December, 1949



A—Display case. Can be riveted together in combination of units. Metal stands hold up cases. Ribbing on sides for decoration. Polystyrene in all colors or crystal clear transparent and opaque. Each unit 4 in. wide, 5 in. high.

B—Star-shaped perfume container. Polystyrene crystal clear in stock. Other colors molded to order; 4½ in. high, star points base 3½ in. wide, container section 2½ in. wide.

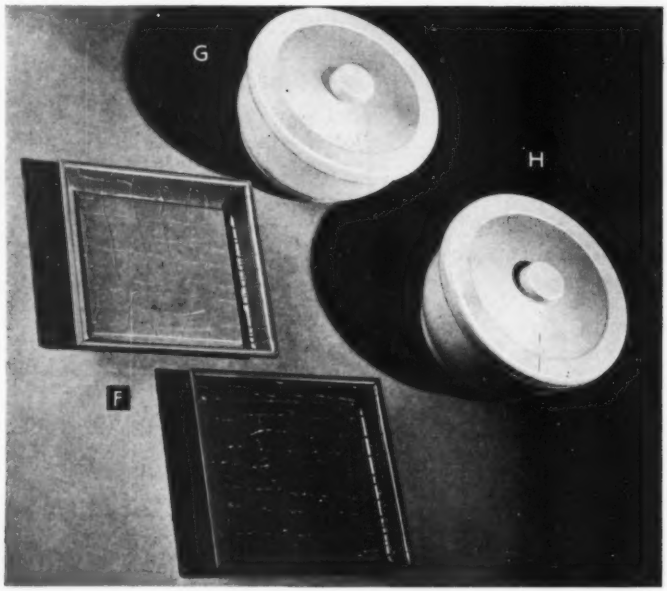
C—Bell-shaped perfume or cosmetic container, friction fit. Bell has clapper that can be left on or removed. Base can be modified for use as ring box. Polystyrene in crystal clear and all colors in opaque and pearlescent shades; 3½ in. wide at base, 3 in. high without clapper handle.

A, B, and C—from Stanley Sapery Co., 341 Madison Ave., New York 17, N. Y.

D, E—Utility boxes. Polystyrene in opaque or transparent. (D) has nine compartments, 7 by 3½ by 1½ inches. (E) has four compartments, 4⅝ by 2¾ by 1⅛ inches. Manufactured by Gilbert Plastics, Inc., 1415 Chestnut Ave., Hillside, N. J.

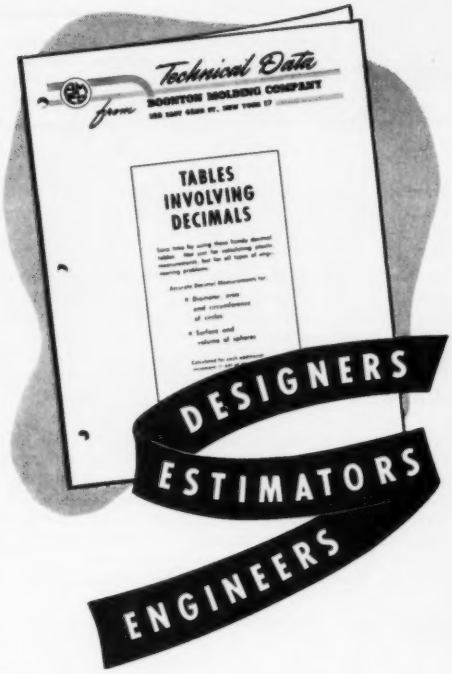
F—Oversized coaster holds stemware or large glasses. Made of polystyrene in alligator effect. Can have gold tooling decoration along edge, or sayings, etc. imprinted in gold leaf; 3½ by 3½ in. in red, blue, and green. Jaydon, Inc., 482 Broom St., New York, N. Y.

G, H—Shaving container (G) in polyethylene and (H) polystyrene in opaque colors. Polystyrene container has snap fit lid. Both have small points at bottom to grip soap; 4 in. wide, 2 in. high. Stanley Sapery Co., 341 Madison Ave., New York 17, N. Y.



Molders are invited to submit samples of stock products to be described on this page as space permits. Address samples and detailed information to Stock Molds Editor, Modern Plastics, 122 E. 42nd St., New York 17, N. Y.

*Reg. U. S. Patent Office.



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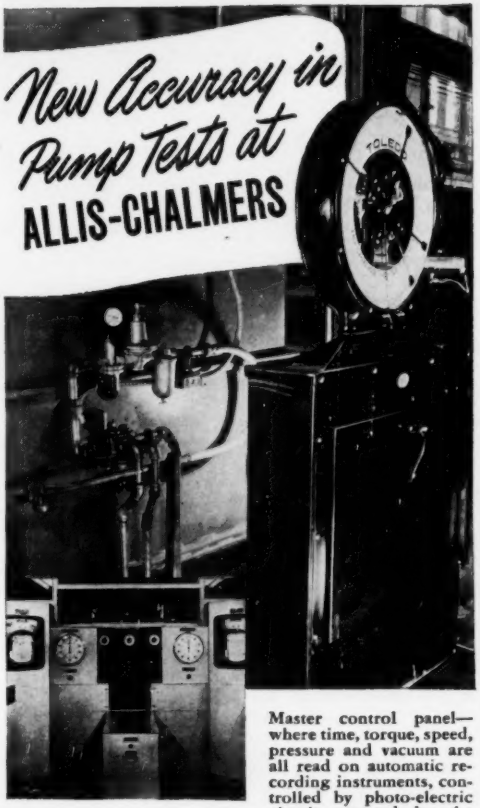

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BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery

"Titanium—Its Occurrence, Chemistry, and Technology," by Jelks Barksdale.

Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Price $10.00. 501 pages.

Many interesting facts regarding titanium are contained in this comprehensive and exhaustive treatise on this element. Titanium is ninth in abundance of the elements in the earth's crust, exceeded only by oxygen, silicon, aluminum, iron, magnesium, calcium, sodium, and potassium. However, titanium pigments were not available commercially in this country until 1918. Titanium metal, with a density of 4.5, high tensile strength, ductility, high melting point, and non-corrosive characteristics, is outstanding as a potential preferred structural metal in jet aircraft design, compared with aluminum of 2.7 density and iron of 7.87 density. Titanium dioxide is an important white pigment in plastics. There are 78 pages of literature references pertaining to these and other aspects of titanium science.—*G.M.K.*

"American Cotton Handbook," by A. R. Macormac, H. R. Mauersberger, and G. R. Merrill.

Published by Textile Book Publishers, Inc., 303 Fifth Ave., New York 16, N. Y. Price $9.50. 940 pages.

The material facts of the cotton industry are covered in this outline of all the important functions of the industry. At the same time, a complete picture is given of the steps from raw cotton to finished goods. Completing the book is a bibliography of American and English books, listings of manufacturers' literature, U. S. Government publications, directories, yearbooks, catalogs, dictionaries, trade associations, cotton magazines, and current cotton motion pictures.

How to handle adhesives for transparent films—Included in this authoritative booklet is a chart describing the properties and characteristics of all principal types of transparent films including cellophane, polyethylene, pliofilm, and cellulose acetate. *National Adhesives, 270 Madison Ave., New York 16, N. Y.*

Rubber and plastics mill (Bulletin No. 173)—This 40-page bulletin on the company's rubber and plastics mills includes a table of sizes, capacities, power requirements, and overall dimensions. Other information covers general specifications; parts lists of single and twin mill units; assembly drawings; and more than 30 illustrations of various types of rubber and plastics mills. Also presented is a brief description of the company's process-testing laboratory. *Farrel-Birmingham Co., Inc., Ansonia, Conn.*

Plastics extrusions—Included in this 42-page, well illustrated booklet is a description of the services that the company offers. The booklet begins by listing the advantages of extruded thermoplastics. Following that is a description of the extruding process; an application check list; engineering, research, and manufacturing techniques of the company; information pertinent to design and engineering; diagrams of extruded sections; supplemental plastic operations, such as cutting and grinding; extrusion materials; and tables and charts on such subjects as thermal expansion. *Sandee Mfg. Co., 5050 Foster Ave., Chicago 30, Ill.*

So you want to bend (Bulletin No. 49)—Specifications, descriptions, and data on pipes, tubes, reinforcement bars, sections, structural shapes, and bending machines—both hand and hydraulic—are presented in this 40-page booklet. Illustrations of sample bends and special bending machines are included. *Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.*

Plexiglas for product demonstration—Contained in this 12-page booklet are a score of photographs that show how the company's transparent acrylic plastic can be used to build working and exhibit models as merchandising aids to demonstrate product design and operation. Included are two pages of data on properties and various forms of the material. *Plastics Dept., Section D, Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.*

Machine tools for metal and woodworking—This 16-page catalog illustrates the line of light machine tools made by the company. A recently revised price list is included. *Walker-Turner Div., Kearney & Trecker Corp., Plainfield, N. J.*

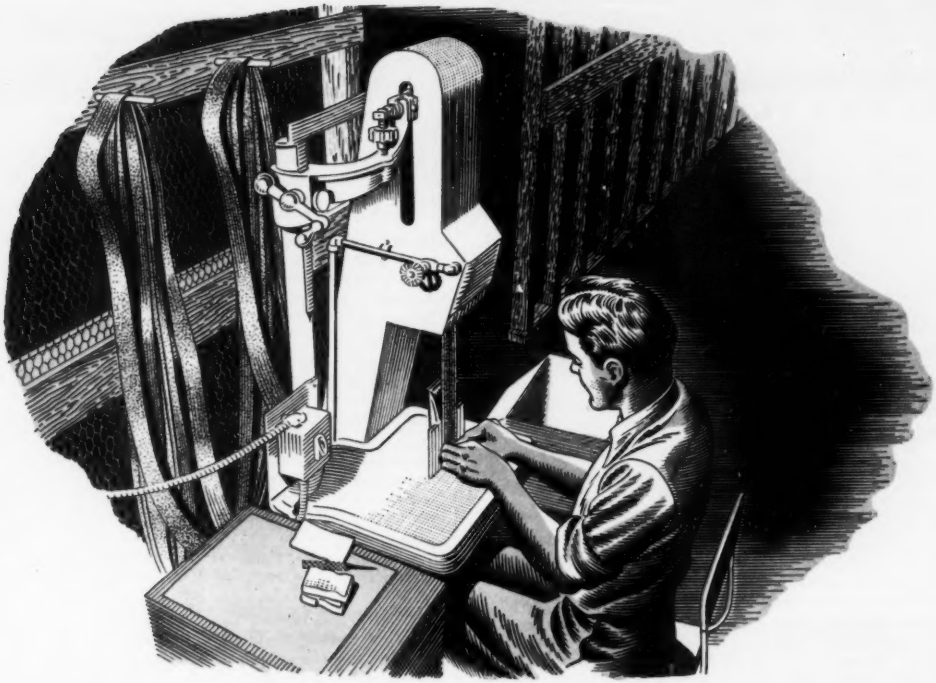
Rust-ban—Detailed recommendations for the selection of rust preventives are presented in this 12-page booklet. In addition to outlining laboratory tests, the publication describes procedures for utilizing the material. *Esso Standard Oil Co., 15 W. 51st St., New York 19, N. Y.*

Properties of selected commercial glasses (Bulletin B-83) and manufacture and design of commercial glassware (Bulletin B-84)—Contained in these two bulletins is basic information on the important properties of glass and on major glass manufacturing methods. *Corning Glass Works, Corning, N. Y.*

The new B & J pellet-dicer—This four-page bulletin illustrates and describes the salient characteristics of the company's new improved pelletizer or dicer designed for use by manufacturers or processors of thermoplastic materials. *Ball & Jewell, Inc., 2½-28 Franklin St., Brooklyn, N. Y.*

Dymo diamond compound—This bulletin presents the grading and color identification systems of the Dymo diamond compound, a compound crushed and graded of pure virgin diamond. Included in the bulletin is a revised price list. *Industrial Products Div., Elgin National Watch Co., Aurora, Ill.*

Welding plastics in Germany (PB 97852)—Three main welding techniques are reported: gas welding of polyvinyl chloride and polyisobutylene; heated tool welding of polyvinyl chloride (including seam welding by the Pfaff welding machine); and friction welding of polyvinyl chloride. The body of the 128-page report, prepared by British investigators, consists of complete



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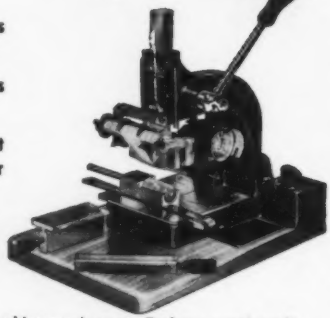

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descriptions of observations made at 21 leading German plants. Illustrations show plastic welded articles ranging from raincoats to ventilating ducts. Additional sections deal with literature, trade names, price lists, and instructions for welding acrylic. The report sells for $16.25 in photostat form, $5 in microfilm. Orders should be addressed to the *Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., accompanied by check or money order payable to the Librarian of Congress.*

Growth of a group—This 47-page book presents a history of British Industrial Plastics Ltd., and its associated companies. Included are pictures of the plants, directors, and products of the B. I. P. group. *British Industrial Plastics Ltd., 1, Argyll St., London, W. 1, England.*

Bakelite phenolic and urea bonding resins for sand cores—This booklet which is actually a data file, describes resin binders for sand cores and the production economies that can be achieved through their use in foundry operations. The data file, which is prepared for insertion in loose leaf binders, includes technical bulletins on the company's urea and phenolic sand core bonding resins for ferrous and non-ferrous metal castings. In addition, data are provided on properties of resins as well as suggestions and procedures for preparing typical core mixes. *Bakelite Corp., 300 Madison Ave., New York 17, N. Y.*

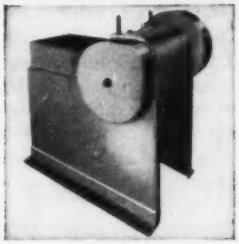
Molding powders—General properties and uses of molding powders are outlined in a four-page folder. Among the products considered are polystyrene, cellulose acetate, vinyl, ethyl cellulose, and polyethylene. Featured is a table providing operating specifications and color information. *Gering Products, Inc., Monroe Ave., Kenilworth, N. J.*

France-Plastique—This 423-page catalog is the first edition of the French National Annual of Plastic Materials and Related Raw Materials. The four sections of the catalog cover manufacturers and importers of materials convertors and distributors, machinery, and syndicates, organizations, and publications of the French plastics industry. *France Plastique, 77, Boulevard du Montparnasse, Paris (6), France.*

Atomic energy levels—Designed to meet the needs of workers in nuclear and atomic physics, astro-physics, chemistry, and industry, this 352-page publication of the National Bureau of Standards is a compilation of all known data on the energy levels of elements of atomic number 1 through 23. The report is available for $2.75. Remittances from foreign countries must be in U. S. exchange and must include an additional sum of one-third the publication price to cover mailing costs. *Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

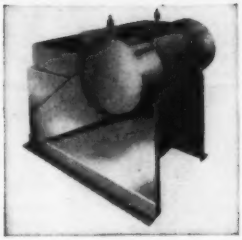
Brookfield synchro-lectric viscometer in use the world over—The advantages of the company's viscometer are outlined in this eight-page booklet. The four different models of the viscometer are illustrated and described. One great advantage of this instrument is its ability to determine and control the rheological, non-Newtonian properties of material. This advantage is discussed in some detail. The construction details of a typical four-speed viscometer are presented in a cutaway drawing. *Brookfield Engineering Laboratories, Inc., 002 Porter St., Stoughton, Mass.*

Cumberland Machines for the Plastics Industry



CUMBERLAND ROTARY CHOPPING MACHINE

This machine cuts slab material from compounding mills, chops continuously extruded rods, sheets of stands and cuts up calendar roll side shear strips. This machine is also used in conjunction with extrusion machines to produce cube or pellet material suitable for a molding compound.



CUMBERLAND SLITTING & MANGLING MACHINE

This machine is useful primarily to manufacturers who compound plastic materials. The machine may be used to reduce material for use as a commercial product without further granulating. Or it may be used to prepare material for subsequent final reduction in a granulating machine.

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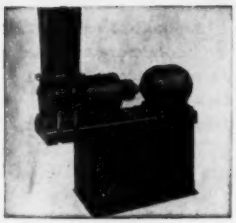

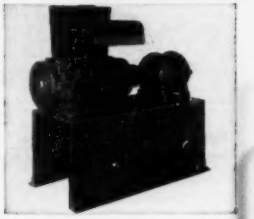

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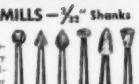

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Production of Plastics Materials

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant, for transfer to other plants of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

The figures of sale given in the present report are not comparable with those for consumption in the producing plants plus shipments to other plants given in earlier reports. The figures for production given in the present report, however, would be comparable with figures for consumption in producing plants plus shipments given in earlier reports except for inventory changes. From month to month these changes in inventory may be substantial, but over several months they tend to even out.

Materials	*Total prod'n first 8 mos. 1949*	*July 1949*		*August 1949*	
		Production	*Sales*	*Production*	*Sales*
CELLULOSE PLASTICS:[a]					
Cellulose acetate and mixed ester plastics:					
Sheets, continuous:					
Under 0.003 gage	4,291,931	494,893	478,839	509,688	551,565
0.003 gage and over	4,859,169	584,063	528,384	593,494	620,582
All other sheets, rods, and tubes	2,716,857	253,190	237,644	302,268	256,856
Molding and extrusion materials	33,366,166	3,430,606	3,544,460	4,626,375	4,254,062
Nitrocellulose:					
Sheets	4,244,941	290,992	321,589	382,926	371,148
Rods and tubes	1,000,694	81,123	103,935	131,287	203,528
Other cellulose plastics[b]	5,136,513	433,489	423,773	113,102	398,818
PHENOLIC AND OTHER TAR ACID RESINS:					
Laminating	24,802,608	2,316,468	1,464,451	2,465,844	1,691,943
Adhesives	16,472,676	2,045,407	1,899,222	2,536,898	2,279,149
Molding materials[a]	70,891,653	4,334,752	5,549,846	8,702,815	8,860,112
Protective coatings (containing less than 10% modifier)	10,445,467	994,434	874,768	1,527,036	1,154,648
Miscellaneous uses, including casting	26,459,318				
UREA AND MELAMINE RESINS:		2,535,841	2,900,691	3,439,780	3,844,328
Adhesives	24,145,034	2,593,280	2,625,372	3,779,812	3,658,126
Textile- and paper-treating resins	16,827,333	1,742,486	1,421,663	2,901,129	2,304,254
Protective coatings, modified and unmodified	10,329,258	1,050,715[i]	1,058,490[i]	1,566,817	1,447,000
Miscellaneous uses, including laminating and molding[c]	29,929,263	1,936,969	2,020,659	2,711,493	3,597,321
STYRENE AND STYRENE DERIVATIVE POLYMER AND COPOLYMER RESINS:					
Molding materials[a]	112,205,728	13,311,628	11,262,566	16,745,593	16,125,263
Miscellaneous uses[d]	17,363,933	2,593,215	2,125,999[i]	3,003,424	2,828,975
VINYL RESINS:					
Sheeting and film, including safety-glass sheeting[a]	89,635,504	10,019,967	10,890,671	12,849,138	14,719,235
Adhesive (resin content)	7,106,964	378,431	729,954	1,542,183	1,043,452
Textile- and paper-treating resins, including spreader and calendering types (resin content)[e]	18,115,534	1,900,865	2,181,975	2,125,269	2,732,626
Molding materials (resin content)	45,137,592	5,560,330	5,516,126	6,329,619	7,541,483
Miscellaneous uses (resin content)	10,928,031	993,865	653,382	816,465	838,790
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:					
Molding materials[a, f]	28,632,004	3,395,388	2,239,141	4,066,668	2,793,274
Protective coatings[g]	30,094,511	3,670,684	3,751,449	4,461,586	4,797,478
All other uses[h]	97,682,467	11,481,608[i]	11,023,805[i]	12,542,623	12,949,049

[a] Includes fillers, plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Excludes data on protective coating resins; these data are included with miscellaneous coating resins to avoid disclosure of operations of individual companies. [e] Includes data for spreader and calendering type resins. [f] Includes data for acrylic, polyethylene, nylon, and other molding materials. [g] Includes data for coumarone-indene, petroleum, silicone, and other protective coating resins. [h] Includes data for acrylic, alkyd coumarone-indene, nylon, petroleum, silicone, and other plastics and resins for miscellaneous uses. [i] Revised.

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Although easily applied by adults, polystyrene shield for covering electrical outlets cannot be removed by children

Wall Outlet Shield

A POLYSTYRENE shield for covering electrical base plugs and wall outlets is now being molded and distributed by the Emeloid Mfg. Co., Hillside, N. J. The shield was devised to reduce the number of home accidents that occur when curious children insert their fingers or metal objects into electrical outlets.

Shield is snapped on

Only a minute is required to apply the plastic shield, which is known as the Safety Socket Shield. First the switch plate is loosened. This is done so that spacer strips, made of transparent polystyrene, can be placed under it. Then the switch plate is re-tightened. Next, the electric plug is inserted in the switch plate. The ivory-colored shield is then placed over the switch plate. The plug cord runs through an opening that is provided at one end of the shield. The last step merely entails snapping the shield firmly in position over the plate. The shield is easily removed by grasping one side and pulling it off.

National distribution

It is reported that although an adult can easily apply or remove the shield, a small child cannot dislodge it. Marketing plans for the polystyrene shield call for national distribution.

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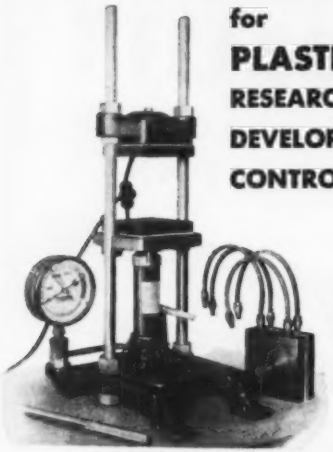

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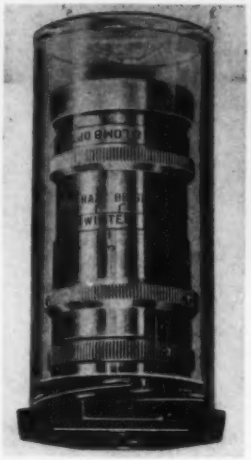

Movie camera lens screws on the black phenolic base of package, is held rigidly in place. Transparent acrylic top of container makes it suitable for displaying lens

Plastics Protect Camera Lenses

A WELL-DESIGNED two-piece plastic container serves as a package, a display, and a carrying case for Animar movie camera lenses made by Bausch & Lomb Optical Co., Rochester, N. Y. The new phenolic and acrylic package solves the problem of effective protection for the delicate lens.

Before the new package was developed, most lenses were packaged with front and rear lens caps to protect the glass surfaces. The body of the lens was subject to injury while on display in the store or while being carried in the camera fan's kit bag.

The new Animar package consists of an octagonal black Bakelite phenolic base and a transparent Lucite acrylic hood. The center of the base has molded-in threads so that the lens can be screwed firmly to the base just as it is mounted on the camera. The acrylic hood can be screwed to the base with a quick quarter-turn. The package is about 3½ in. high and 1½ in. in diameter.

To the dealer, the transparent lens package offers a method of displaying the delicate, valuable lens without exposing it to bumps, jars, or scratches. With merchandise which sells for between $50 and $100, this is an important consideration. Even if the package is put on its side, the octagonal shape of the base prevents the container from rolling.

For the camera fan, the new package is a safe convenient carrying case which takes but little more space in his accessory bag than the lens itself. And the transparency of the container makes it possible to tell one lens from another without opening the cases.

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The Hartig No. 2 extruder is illustrated and described in this booklet, together with a brief account of its development. A specification sheet is also included. The Hartig Engine & Machine Co. 6 pages. **(12-52)**

EMBEDMENT BY MOLDING

Reprint of an article published in the October issue of MODERN PLASTICS giving information on embedding articles in clear acrylic by compression molding. 2 pages. Creative Plastics Corp. **(12-53)**

PLASTIC EXTRUSIONS

Description of the extrusion process, application check list, research and manufacturing, design and engineering, extruded plastic sections, supplemental operations, and materials are covered. 42 pages. Sandee Mfg. Co. **(12-54)**

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A reprint from the October 1948 issue of MODERN PLASTICS, this article discusses luminescent pigments when combined with any of several different resins to produce a molding material with interesting present and potential uses. 8 pages. Luminescent Plastics Corp. **(12-56)**

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The advantages and layout of a central hydraulic system for operation of hydraulic presses, using either a variable or a constant stroke Aldrich pump. The Aldrich Pump Co. **(12-57)**

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Loose-leaf bulletins dealing with Bakelite urea and phenolic sand core bonding resins for ferrous and non-ferrous metal castings. Properties and basic advantages of the various resins and formulations are included. Bakelite Corp. **(12-58)**

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Bulletin on molding techniques, feeding, cylinder temperatures, injection pressures, cycles, mold design, annealing, and other data on Cerex 250 and 250X, a thermoplastic molding powder with increased heat deformation resistance and dimensional stability. Monsanto Chemical Co. (12-74)

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A properties chart of representative Du Pont plastics, with a thumbnail discussion of the significance of these properties. 6 pages. E. I. du Pont de Nemours & Co., Inc. (12-75)

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Illustrated booklet describing Banbury mixers and mills (with tables of sizes and capacities); also extruders, calenders, etc. Typical schematic layouts are included. 8 pages. Farrel-Birmingham Co., Inc. (12-76)

CARBON BLACKS
Analytical properties, processing behavior, tests on vulcanizates, and tabulated data on carbon blacks in natural and synthetic rubbers. Godfrey L. Cabot, Inc. (12-77)

PLASTIC PIPE AND FITTINGS
Price lists and specifications on Mills plastic pipe and fittings. Physical and chemical properties are tabulated and information is given on pipe welding and threading. Elmer E. Mills Corp. (12-78)

SCRAP GRANULATOR
Bulletin describing the Van Dorn scrap granulator for rigid thermoplastic scrap. Features, specifications, and illustrations are included. Van Dorn Iron Works Co. (12-79)

STAMPOMATICS
Specifications, features, and descriptions of two Stampomatic machines used for increasing the efficiency of stamping and embossing operations. Printing Industries Equipment, Inc. (12-80)

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Characteristics, specific applications, specifications and physical constants, and comparative tests with other plasticizers, on plasticizer SC, a plasticizer with excellent low temperature properties and low heat loss. E. F. Drew & Co., Inc. (12-81)

PLASTIC MACHINERY AND TOOLS
Folder containing six bulletins giving specifications and features of various presses, cutters, sawing machines, etc. used in the plastics industry. Prices are included. Barker-Davis Machine Co., Inc. (12-82)

ENGRAVING MACHINE
Machine specifications, illustrations of master copy type for use with this machine for sunk engraving, advantages, features, and other information on the Portable Pantograph Engraving Machine Type Ind. A are given. New Hermes, Inc. (12-83)

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Illustrated 4-page booklet showing various molds and plastic fabricating equipment as offered by Standard Tool Co. (12-84)

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Various vibrators, valves, and fittings are illustrated and described in this 12-page brochure. Specifications are given. Cleveland Vibrator Co. (12-85)

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Advantages, specifications, features, and other information on Elmes Hydrolairs, power operated production presses that have neither motors nor pumps. 4 pages. Elmes Engineering Works of American Steel Foundries. (12-86)

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An explanation on why ghosting or mark-off occurs in vinyl printing, with a discussion of how to prevent this trouble. Atlas Coatings Corp. (12-89)

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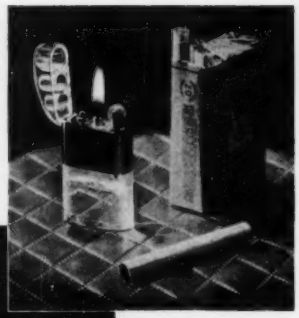


Improved pocket lighter has main body of molded acrylic. Hinged cap, available in same material, is attached to top plate

Table-desk lighter features translucent molded fuel chamber. Acrylic reservoir comes in topaz, crystal, emerald, or ruby

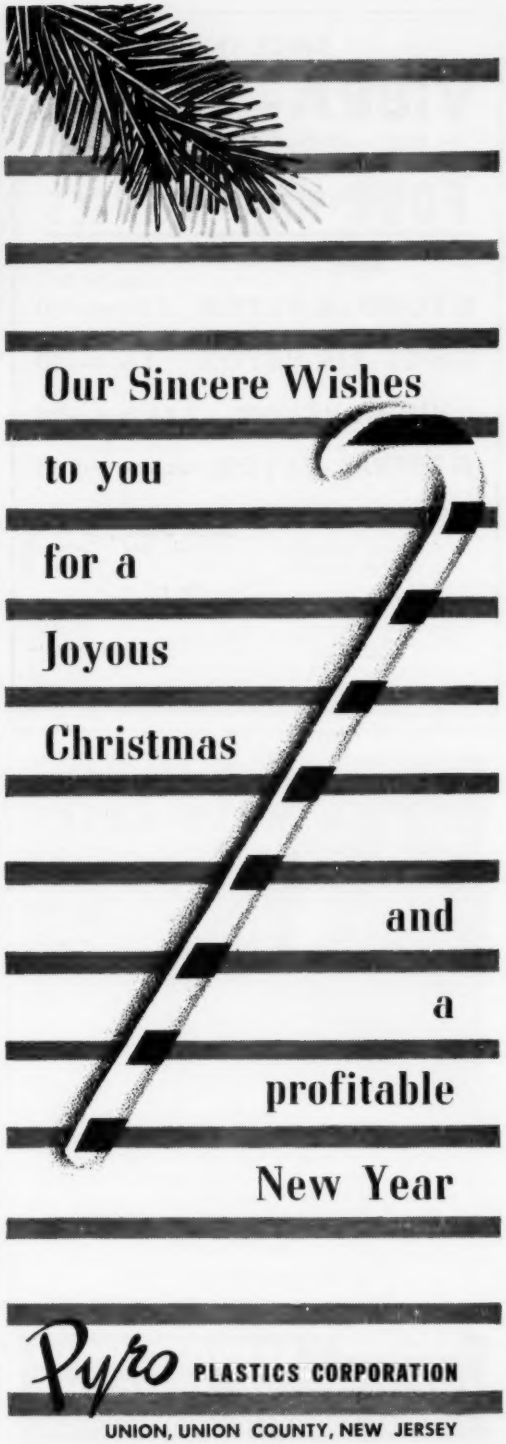
Cigarette Lighters in Acrylic

COMBINING quality appearance with practicality, Ritepoint Co., St. Louis, Mo., which last year introduced a cigarette lighter with a transparent fuel chamber, has announced an improved version of this device and the development of a new table-desk model also utilizing a visible fuel reservoir.

The new table-desk model, of Grecian Classic design, embodies a translucent molded Lucite fuel chamber with a metal cap and base. Holding a long-lasting fluid supply, the acrylic reservoir is offered in crystal, emerald, ruby, or topaz colors. The lighter is constructed so that fuel is metered manually into the wick chamber only as required, reducing evaporation of fuel.

In promoting the lighter, Ritepoint emphasizes that it "signals the eye long before dry." There is little danger of running out of fuel, since the amount of fluid remaining can always be seen through the plastic storage chamber.

The improved version of the pocket model lighter, available in the same choice of colors, uses molded acrylic for the main body which supports the spark wheel, wick assembly, and wick reservoir and valve, and also serves as the fluid chamber. The hinged cap of the pocket model may now be had in either metal or molded acrylic. Added durability is achieved by hinging the cap to the metal top plate instead of to the body.



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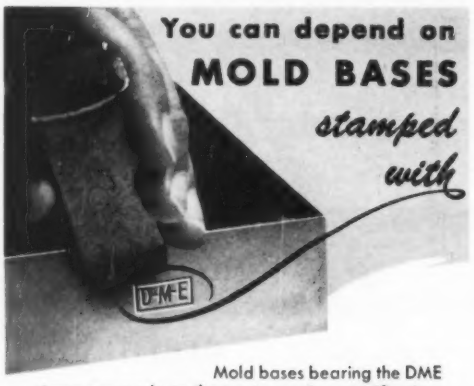

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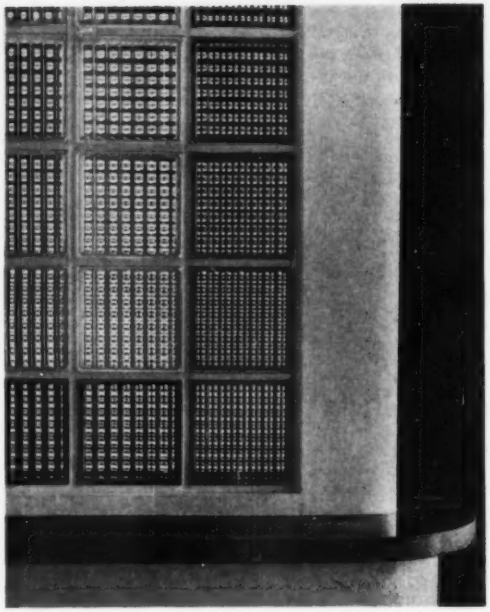


Partition built of polystyrene-and-wood panels has light squares molded of clear material, dark ones tinted rose

Decorative Panels

MOLDED polystyrene squares are bonded to wood frames to form translucent decorative panels which are manufactured and sold by Victor Stanzel & Co., Schulenberg, Texas. The new panels, which are being sold under the trade name of Glassite Panels, are recommended for interior partitions, counters, bars, theaters, and homes.

The basic element of the Glassite panels is a 4⅛-in. fluted square which is molded of transparent Lustrex or Styron. By placing horizontally-fluted squares on one side of the panel and vertically-fluted squares on the other, is is possible to get a panel which has excellent light transmission, but is translucent rather than transparent.

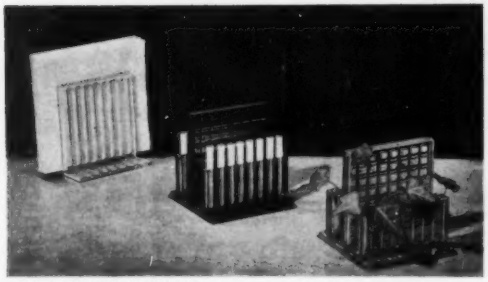
The small polystyrene squares are bonded together inside a wooden frame to form 1¼-in. thick Glassite panels of various sizes. These panels can then be joined with simple millwork, with metal frames, or joined directly to each other to make larger patterned panels or partitions to suit each particular application. Quarter round or other standard molding can be used to hold the panels in place.

Five standard panels are available. The smallest has an over-all measurement of 9½ by 9½ in.; the largest is 18¼ by 35¾ inches. All sizes are available

in crystal clear material or in transparent rose, blue, amber, or green. The two largest panels are also made with the central squares in one color and the squares around the periphery of the panel in another color. The panels are delivered completely finished and ready to install; no further painting or finishing is required. Various special effects, such as the pinwheel arrangement illustrated below, can be obtained by combining panels of different sizes or shapes or by arranging the panels in patterns.

Home accessories a by-product

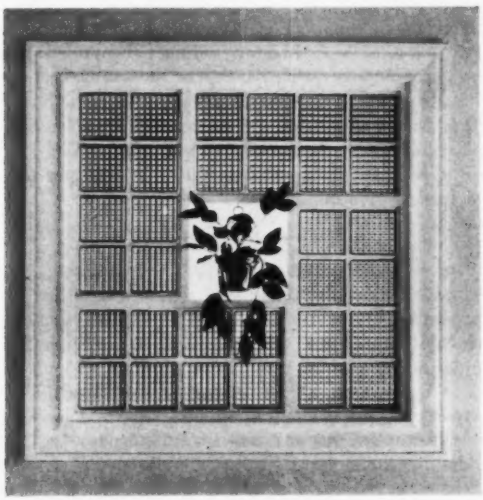
The polystyrene square tiles which are used to make the Glassite panels are also used to make a number of decorative home accessories. The Stanzel company has designed a number of flower stands, cigarette holders, napkin holders, and book-ends which consist of tiles and half-tiles cemented together.



COURTESY MONSANTO CHEMICAL CO.

Molded polystyrene tiles used to make new panels can also be used to make napkin holders, cigarette holders, etc.

Example of decorative effects possible is window made up of four panels set pinwheel fashion around center opening



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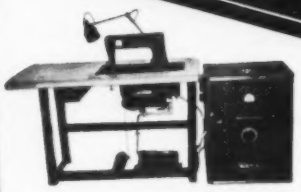

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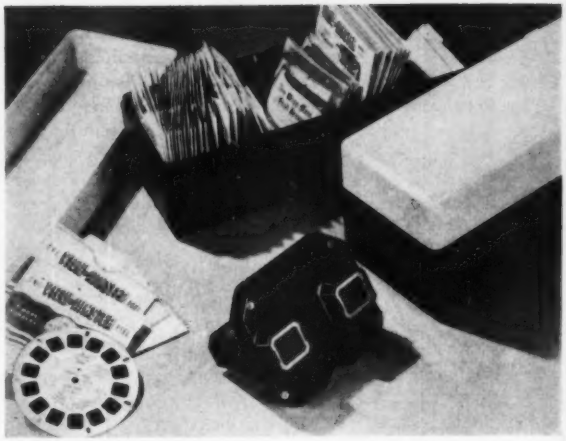

COURTESY BAKELITE CORP.

Stereoscope and container are both injection molded of polystyrene. Container also holds library of films

Stereo Viewer and Box

POLYSTYRENE is now being used to make a stereoscope for bi-optical viewing of three-dimensional color pictures as well as a "film library" box which acts as a storage container for both the stereoscope and its "reels."

The storage container is molded by Beaman Plastic Products Co., Portland, Ore., for Sawyer's, Inc., also of Portland, who molds the stereoscope. Bakelite polystyrene was chosen for the viewer and box because of its dimensional stability, low cost, and ease of molding.

The stereoscope, which is marketed under the trade name of View-Master, is injection molded in two parts by Sawyer's on a Stokes automatic press. The two polystyrene parts are riveted together. Other parts and assemblies, such as the glass lenses and metal reel slide, are held in place by molded-in polystyrene shoulders or pins that join together at the time of riveting.

Two molds used

The storage container is injection molded on a DeMattia 12-oz. machine. Two molds, made from Carpenter's Air-Hardening steel, are employed: a two-cavity mold for the ivory-colored top and a single-cavity mold for the maroon bottom.

The box, which is sold separately, will hold one stereoscope and 100 to 150 educational stereoscope reels. Actually, the box has a dual purpose—as a holder for the stereoscope and simultaneously as a file for valuable color films.

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Polyethylene Tape for Electricians

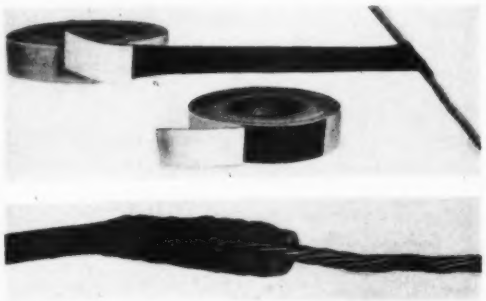
A NEW self-bonding polyethylene base electrical insulating tape that simulates many of the physical and insulating characteristics of an extruded jacket has been announced by Bishop Gutta-Percha Co., New York, N. Y. The plastic tape has attracted the interest of the electronics and electrical field because it permits factory-grade cable patching in the field.

The most distinctive feature of the plastic tape, which is known as Bi-Seal, is its ability, due to its "plastic memory," to fuse its layers into a uniform mass after application.

When the tape is applied to a splice, it is stretched approximately 150% and wound under normal taping tension. After winding, the "plastic memory" comes into effect as the elongated tape attempts to return to its original form. The result is that great pressure is built up within the turns of tape. Because of this pressure, the molecular transmission of the polyethylene compound causes the layers to fuse into a solid mass, as shown in the cut-away section in the photograph below.

The self-bonding quality of Bi-Seal, it is reported, contributes to its weathering properties. There are no adhesives to slip or deteriorate under adverse weather conditions and there are no plasticizers to vaporize under changing temperature conditions. It is further stated that Bi-Seal taped splices have a life of at least six years and will withstand temperatures ranging from 160 to —20° F. The tape is resistant to ozone, oxygen, and commercial concentrations of acids and alkalis.

Self-bonding polyethylene tape is stretched approximately 150% under normal tension when tapping electrical cable



Insulating tape, attempting to return to original shape after elongation, fuses into solid mass over wire splice

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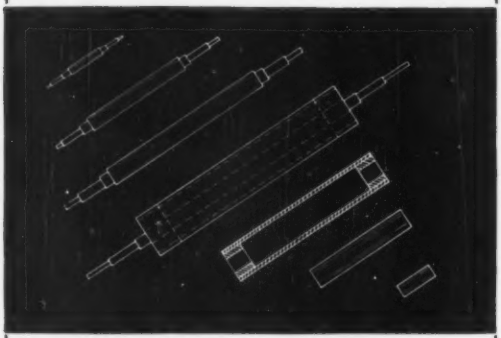

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Gravure Printing

(*Continued from page* 88)

and in many cases light stabilizers are added to the ink. Pigments with metallic flakes, mostly aluminum, give striking effects. Fluorescent and phosphorescent inks, made with metallic salts, are also successfully used to give to the film a "glow by night" effect.

Printing means covering. On a non-absorbent surface like that of plastic film, the quantity of ink or of the binder in the ink, or even the quantity of the pigment itself, is not as important as the way the ink is put on the surface of the film. If this operation—actually a coating operation on a very minute surface—is rightly done, through the right engraving and the right viscosity of the ink itself, only small amounts are necessary to give to the color its maximum intensity and brightness.

Not to let the ink manufacturers brag too much, they should be reminded that more vivid colors are yet needed, that a really good red remains to be found, and that the perfectly suitable ink for vinyl film has not yet been made. It should be so formulated that the solvent of the ink will not penetrate the film, thus avoiding the problem—and the cost—of having to dry that part of the ink solvent which penetrates the film itself. To change the nature of the binder so as to get an ink solvent which is not a solvent for the film is unfortunately not enough. Toluol, for example, is not a solvent for the film, yet it will go right through the film nearly as well as a real solvent, using the open spaces between the chains of molecules as water runs through a sieve. Inks made of organosols have been tried, as well as inks of vinyl latex. This is work in the right direction.

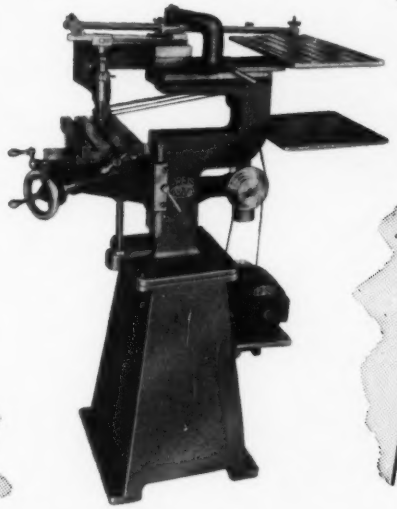
Needed improvements in film

In spite of the outstanding success of the printed vinyl films, there is a great deal of room for improvement in the film itself. Much has yet to be done on the plasticizer. With vinyl resins having such outstanding durability, practically not aging much more than glass does, it is a pity that even the best plasticizers evaporate at such a fast rate, that many of the draperies sold only two or three years ago today feel more like cardboard than film.

The choice of the right stabilizer is also of great importance to inhibit the decomposition of the resin under light and heat.

There should be further improvement made in the resistance of vinyl film to heat, at least for those films used as table cloths. Too many of the table cloths sold recently show ugly bulges where hot cups of coffee have been put on them. A new film finishing operation has been developed which does

(*Please turn to page* 155)



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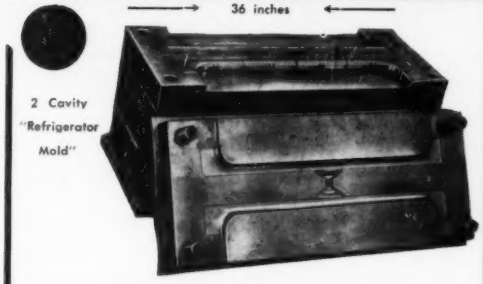

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plastics and metals

(*Continued from page* 152)

to the vinyl what vulcanization does to rubber. It should be applied in every case where higher heat resistance is needed.

Converters and distributors should also do something else to brighten the vinyl film picture, something they won't like because it touches their price structure and seems to hurt their immediate interests. This is: do not sell articles made of 4-mil film when 6 mils or, in many cases, 8 mils, are needed. Small kitchen, bathroom, or cottage curtains are quite all right in 4 mils or even in 2 mils, if it is a cast film. But as soon as longer drapes are needed, or drapes for wider windows, or drapes which will have to be drawn and moved very often, they should be made of 6- or even 8-mil film. A table cloth made of an 8-mil film stays beautifully put on the table and lasts four times as long as one made of a 4-mil film.

From present indications, a market exists today for the sale of 3 million or even 5 million yd. of printed film a day. It appears, however, that two steps are necessary to achieve that goal.

The first step is concerned with the embossing of the surface of the film. Many people dislike a shiny "oil-cloth" look. It is true that a dull finish can be applied on the printing machine. The effect is quite striking, especially when the dull finish is applied only to those parts of the design where vivid colors are not needed, leaving for example, flowers in bright colors against a dull background.

The greatest improvement will come, however, from embossing the film. There is a new embossing machine which treats the finest film at high speed. Every printer's shop should have one. By proper embossing the film can be given not only the look but the feel of a fabric. When the girls start to feel the films between their fingers, as they do with the fabrics they buy, sales will soar. For the converter, combinations will be possible which will give him three different selections from one design: first, printing on plain film; second, printing on embossed film; third, and generally the most beautiful, embossing after printing.

It is a question of civilization

Having good films, good plasticizers, good finishes, good touch, and right thicknesses is not too much to ask, and all those improvements will be coming sooner or later. But this is only the first step in reaching the potential market. The second step touches on a subject which really belongs to the realm of hopes and dreams more than to the present possibilities. It is less a question of markets and economics than one of civilization. Can we get really beautiful designs or do we have to see the same crass spirit invading the plastic film market as has degraded the printed fabrics market?

Hundreds of designs are presented whose basic artwork has been hasty, with "make believe" instead of real work. Most are painful imitations of successful original work and they are only presented so that they can be called "exclusives" and so that easy money can be made. It is real artwork that sells the most. I have seen one company's good design selling over 3 million yards. Fewer designs and better ones are what the market needs.

In the case of printing machines, serious improvements should also be made. The best rotogravure presses, after all, were not made for vinyl printing.

The ideal film printing machine

In the ideal machine the film should be fed and stuck on an endless belt, which will incur no deformation under the necessary tensions between the units. The machine should have five units with fountains not more than 3 ft. from the floor. The first unit should be used for the blotchings or the underlays, the second for the yellow, the third for the red, the fourth for the blue, and the fifth for surface finishing or protective coatings.

There should be a distance of at least 9 ft. between each unit for effective drying at 500 ft. a minute. The machine should be built in 54 in. width, with a possible 54 in. repeat, and registration should be controlled by photo cells.

The most important improvement would be one which would permit a fast change from one design to another. To achieve it, the ink transfer system with the engraved cylinder, the enclosed fountain, and the doctor blade mechanism should be built in one unit, so that it could be detached from the main frame in a few minutes and replaced within the same short time by a new, similar unit containing the new design cylinders, all fixed and prepared in advance. This would be the greatest contribution that the rotogravure machine builders could make to the vinyl film printing industry.

With constant improvement in printing methods and machinery, in inks, in finishing, and in embossing, vinyl films should have in our time the place of the *Toile de Jouy* of the 19th Century. With such progress, they soon should not only be used in drapes in every room in the home but they should also cover the walls. Without being visionary, it is easy to see plastic films replacing interior paint more and more—and other wall coverings as well. They have already started to do it. After all, what is paint if not a film, generally irregular, often made of inferior resins and put on the wall by hand at high cost and at great inconvenience for the customer. With the rotogravure machine and the half-tone process it is not too much of a dream to think that the most beautiful oil paintings and frescoes of the artists of the past, as well as of those of the present and of those of the future, will one day decorate for a few cents a yard the walls of the most modest of our homes.

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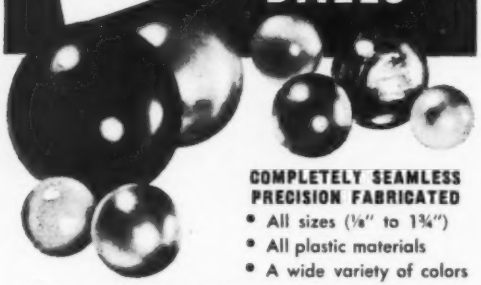

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Polyvinyl Chloride

(*Continued from page* 116)

coatings, etc. There are some disadvantages in their use, however, in that they are water soluble and a vinyl film containing them will increase in opaqueness when in contact with humid air or water. They impart a measure of heat stability to thin films and can sometimes be used alone. In thick films, however, there appears to be only very little heat stabilizing action and, in general, a heat stabilizer, such as one of the lead compounds, is necessary with these phosphates.

Ultra-violet screeners.—Another method of stabilizing polyvinyl chlorides to light is to incorporate in the plastic a material that is capable of removing or diminishing the harmful light rays. In this class are the ultra-violet screeners such as salol (phenyl salicylate). This type generally offers very little, if any, heat stabilizing action and must be used in conjunction with other stabilizers although salol may have some antioxidant properties due to the phenol group. Pigments are also in this class of light stabilizer and quite often, when pigment of the proper type and amount is added, no other light stabilizer is needed. For this reason, most of the basic lead salt stabilizers offer some light as well as heat stability.

Factors affecting the choice of a stabilizer

The factors affecting the choice of a stabilizer can be grouped into three general categories: 1) formulation, 2) processing conditions, and 3) end use of the vinyl article. No one stabilizer has been produced as yet that can compensate for all the variables occurring in each of these categories. Thus, a pre-stabilized resin would be limited greatly in the number of its possible uses.

Formulation.—In the formulation of a polyvinyl chloride or copolymer plastic, the type of resin and the kind of plasticizers used probably affect the choice of proper stabilizers, and the amounts in which they should be used, more than do the other ingredients. All of the reasons why different resins require different stabilizers are not yet known, but differences in molecular weight, the number and type of reactive groups, such as free radicals, remaining in the resin after polymerization was halted, and the type of copolymer used, are among the contributing factors.

Not too much detail can be given here in regard to the effect of the plasticizer on the stability of the vinyl plastic since there is a very great variety of plasticizers being manufactured and used in vinyls today. In general, materials such as the chlorinated or phosphate ester types, which are capable of liberating a strong mineral acid as one of their decomposition products, may require stabilizer to neutral-

ize the acid liberated from the plasticizer as well as that normally required for the resin. Recent improvements in this type of plasticizer, however, have caused their other advantages, such as flame resistance and, in some cases, lower processing temperatures, to overshadow this disadvantage.

Pigments, dyes, fillers, and extenders used in the formulation should exhibit as little reactivity as possible with the stabilizer chosen. Thus, acid dyes and pigments should not be used with strongly basic stabilizers. Neutral, or nearly neutral, soaps and salts and the epoxy type stabilizers generally show very little, if any, reaction with the ingredients mentioned.

Stabilizers can also have an effect on the leafing of such pigments as aluminum. Especially is this true in the film casting of resin solutions. Leafing, which is the orientation of the pigment flakes parallel to the surface of the film, gives the vinyl sheet a bright metallic luster which is often desired.

Processing conditions.—The time and temperature of processing are probably the first of the processing factors to be considered when choosing stabilizers. The more severe these conditions are, of course, the greater the problem of stabilization. Also, if there is a high percentage of rework stock, excellent stabilization is necessary.

Stabilizers can greatly affect the so-called lubricity of the plastic. Lubricity, sometimes confused with plasticity, is that property which reduces friction, e.g., between the die surface and the plastic in extrusion. Plasticity, on the other hand, is the ability of the plastic to be deformed, and in extrusion it is the ability to be forced through the die. Thus, the extruder, when used to evaluate the physical characteristics of vinyl compounds, might be compared to a capillary viscometer in which the viscosities of very thick materials are measured by weighing the amount extruded through the capillary under high pressure in a given length of time. Thus high plasticity and high lubricity affect extrusion rates similarly, accounting for some of the confusion.

Some stabilizers tend to increase plasticity as well as lubricity. This is quite common with the stearates which are quite often added as lubricants though they also serve to increase the plasticity. While high plasticity is often desired in extruded plastics manufacture because of the increased output, it is not always desired in milling or calendering operations, since high plasticity may cause sticking of the sheet to the hot roll. Quite often, when a stabilizer increases the plasticity of a vinyl sheet causing sticking, a mistake is made in not actually taking advantage of this property by lowering the working temperature.

Another property closely related to the plasticity of a vinyl material is its heat sealing ability. A stabilizer that tends to increase the plasticity also tends to increase the rate of heat sealing, assuming

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Another factor to consider in the choice of a stabilizer is the presence of volatile materials, such as solvents, in the stabilizer. This is especially important in cases where plastisols are used in fairly thick layer and are cured in their final form. If volatiles are present, the formation of bubbles is almost inevitable.

Testing of stabilizers

In order to finally determine the value of a given stabilizer for a particular application, it is desirable to subject the plastic containing the stabilizer in question to the exact conditions which will be encountered. However, though a plastic manufacturer might include an untried stabilizer in his various batch formulations and rather readily draw conclusions regarding the advisability of using it, the value of materials is ordinarily too great for such a risk to be taken. Thus, standard test methods for initial evaluation are required, even though a prediction as to a stabilizer's function in the plastic may be subject to revision, based on actual service tests.

The American Society for Testing Materials has set up tentative tests for plastic testing which are of value as a basis for tests on the stability of polyvinyl chloride and its copolymers:

1) "Determining Permanent Effect of Heat on Plastics" (D794-44T).

2) "Colorfastness of Plastics to Light" (D620-45T).

3) "Haze of Transparent Plastics by Photoelectric Cell" (D672-45T).

4) "Effect of Moisture on Plastics" (D570).

Following is a discussion of the more important tests as used by the authors in the Ferro laboratories, representing general conditions as used by some of the leading processors and manufacturers for the initial evaluation of stabilizers. Most of these tests and special considerations are well known to the trade. However, they have been consolidated here for ready reference and for those who are new to the trade.

Heat testing

Heat testing of the resin is perhaps the most important of all tests, since in preparation most vinyl films are subjected to heat at some point in the processing. However, due to the variations of the heat cycle among manufacturers, there have arisen several types of heat tests, each of which is designed to simulate some particular type of plant processing. Thus, the static, dynamic, and open mill methods are most representative of calendering conditions, whereas the platen method more closely predicts the response of the resin to extrusion conditions.

Static method.—The test sample may be between 20 and 80 mils in thickness, but close adherence to a given thickness must be obtained in any one test to give comparative results. In this test, the prepared

samples are placed on glass panels and held at an oven temperature of 350° F. for 45 minutes. After cooling to room temperature, the samples are compared to a standard color scale. It has been found that the Gardner color standards are convenient for this purpose. Because of the simplicity of this test, it is perhaps most generally used. However, since only major differences may be observed by this method, it is best to use it only for rough screening of stabilizer effectiveness.

Dynamic method.—Test samples are prepared very much as for the static method. This test differs from the static method in the following respects:

1) The temperature of the test is 300° F. instead of 350° F. This gives a more gradual degradation, and thus more readily shows differences in stabilizer effectiveness.

2) Color readings are taken at regular intervals until the sample reaches a predetermined color. To give a better picture of stabilizer activity, the authors have usually taken readings at a relatively low color (Gardner 6) and also a higher color (Gardner 12). The time in minutes for a sample to reach these standard colors is the rating of stability on a given resin-stabilizer combination.

3) The samples are suspended from a horizontal, rotating wheel to give free access of air to all surfaces, thus eliminating unequal effects of oxygen.

4) The rotation of the samples prevents the effects of oven hot-spots, since even in ovens of the best construction it is difficult to prevent hot-spots.

A method the authors have found practical for evaluating the heat resistance of a specific system, and thus the heat stabilizing qualities of a stabilizer, is to plot on a graph time versus absolute color. The curves obtained are of interest because stabilizers fall in several distinct classes, performancewise. Typical curves are shown in Fig. 1. Curve 1 is an example where the color development in the material is directly proportional to time. Thus, the color increases an equal amount during any given time period. Curve 2 is one in which the color stays light for a time and then increases very rapidly. If the time before appreciable color increases can be made acceptably long, this is ideal. Curve 3 is a type often encountered in which the color of the stock rapidly rises to a plateau subsequent to which there is little or no darkening for some time, though finally an abrupt increase is encountered.

Platen test.—In the platen heat test, the milled sheet is held between chromium plated platens for a period of 45 min. at 350° F. (±1°). The variation in the activity of combinations of stabilizers is indicated by comparison to the Gardner color standards or by color description in which the colors range from a faint straw color to black. The platen heat test is considered by some to be especially indicative of extrusion performance. In the case of most metallic soaps, the correlation between the

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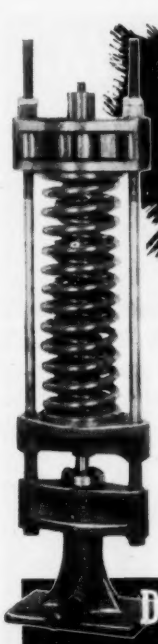

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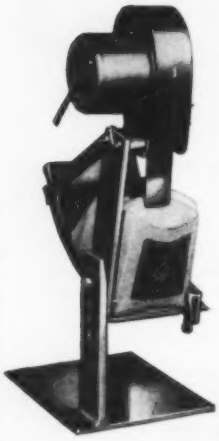

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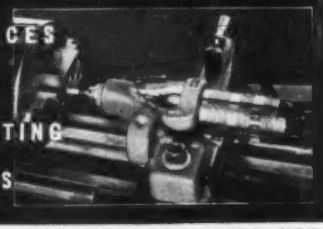

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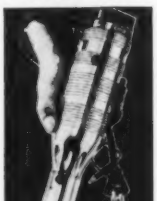

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dynamic test and the platen test is generally excellent.

Open mill method.—In the open mill test, sample strips are cut at regular time intervals and at a constant mill temperature from the main mass being milled. Comparison of the strips from several millings gives comparative color—time curves for the various stabilizer combinations under test. This test is felt by some to be the best for closer predictions of the stabilizing effects under production conditions. However, since it is the most time consuming of all heat tests, it should be used only after the stabilizer under test has passed either the static or dynamic test.

Light testing

As everyone knows, there are a great many variations in light testing procedures used. It is rather difficult to judge which variation most closely represents the conditions met in the use of the finished article, but probably most of the methods are adequate as long as comparisons are made with materials which are known to have adequate stability.

The basic source of light is usually the Fadeometer or the Weatherometer. The temperature of samples in the Weatherometer is between 130 and 140° F. when the water spray is not used. It will be somewhat lower when the water spray is employed. The authors have found that large variations in the wavelength of light reaching the samples may be eliminated if two of the eight filters are replaced every 500 hr. instead of replacing all eight of them at the recommended 2000 hours.

There seem to be at least two basic methods of reporting breakdown due to light. One is based on the formation of "spew" or "tack" and darkening of the surface of the sample; the other, on the point of film embrittlement. The first method of reporting breakdown is generally used on films 10 to 30 mils in thickness; the second with relatively thin films of 2 to 8 mils. It is true that the correlation between these two methods is not perfect but, in the authors' experience, they both serve to predict stabilizer effectiveness. Using thick films, results may usually be obtained in approximately one-third the time required for thin films.

Opacity testing

Opacity tests are usually made only on films which are substantially clear. Opacity may be rated by visual comparison to a standard, or use may be made of a photoelectric cell. Probably the former method is most generally used, in which case the system under test is rated merely by observation as good, fair, or poor in reference to the standard.

In the processing of films, gradations of haze are not too important, because in general either a completely clear stock or a definitely translucent or opaque stock is desired. Thus, in a clear stock, any

haze greater than that in nonstabilized stock might be rated as poor.

Moisture testing

In this test, the samples are dried at 50° C., weighed, and immersed in distilled water at 25° C. for 24 hours. At the end of this time they are removed from the water, the surfaces dried, and the samples reweighed. The percentage increase in weight is taken as the rating of moisture stability. Notations should also be made of any changes in physical appearance due to the immersion in water.

When the materials under test contain any appreciable amount of water-soluble ingredients, the samples are reconditioned after immersion, for the same time and at the same temperature as in the original drying period. They are then cooled and reweighed. If the reconditioned weight is less than the conditioned weight, the difference is considered as water-soluble matter lost during the immersion. In such cases, the water absorption value is the sum of the increase in weight on immersion and of the weight of the water-soluble matter.

In thin clear films it is often practical to merely compare the degree of haze caused by immersion in water.

General considerations in testing

There are a number of factors to keep in mind in vinyl testing which, if neglected, may lead to puzzling results. Though many laboratories have learned of these by trial and error, for the benefit of newcomers to the field, a few are discussed below.

Ultra-violet light.—It has been noted by members of the staff of Monsanto Chemical Co. in evaluation of phosphate ester plasticizers, that a vinyl sample which has been exposed to ultra-violet light and then left stored in the dark may reach a darker color than a duplicate left exposed. From this it appears that ultra-violet light may act as a stabilizer in reference to color. Of further interest, samples which have been heat tested may become lighter in color on exposure to light. Therefore, until results of such tests are recorded, the samples should be protected from strong light sources.

Volatiles.—During the heat testing of samples varying greatly in composition, it should be kept in mind that volatile components from one type of sample may affect the stability of another type adjacent to it. This effect has been observed in testing samples containing different types of plasticizers and stabilizers. Those samples containing a stable plasticizer showed stability ratings, in some cases, as low as those compounded with the plasticizer of low stability.

Effect of heat history on light stability.—If breakdown of the resin is started by heat, its resistance to light degradation is usually substantially reduced. Therefore, close attention should be given to the preparation of samples to be certain that processing

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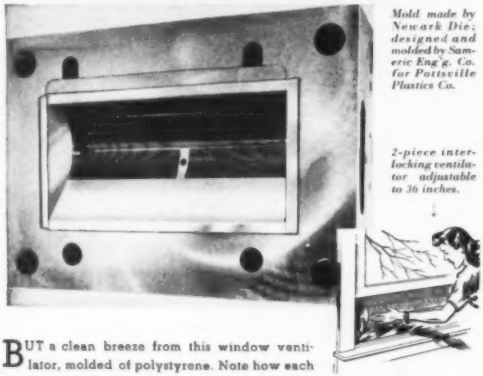

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cycles are the same for materials that are to be compared for stability.

Film thickness.—As noted in the section on light testing, thick films exhibit more rapid color degradation than do thin films. Also, in the case of heat testing, apparent degradation is greater in thick films than in thin films. Therefore, it is necessary to keep film thickness constant in any series of comparative stability tests.

Oxygen.—In conducting heat tests in the presence of air, care must be taken to have the same amount of oxygen available to all samples being compared, since some stabilizers cause the stock to darken in the presence of oxygen at high temperatures, while others have a bleaching effect. Quite possibly this may be the reason why the platen heat test gives better correlation with extrusion than any other heat test.

The large amount of research being spent on stabilizers for polyvinyl chloride and copolymers is causing the picture to change almost daily. Although it is thought that all polyvinyl chlorides and their copolymers tend to break down under the influence of heat and light through somewhat the same mechanisms, it has been impossible so far to find the common denominator for all resins under all conditions. The numerous methods by which a polyvinyl chloride can break down has made it necessary to use, in most cases, more than one stabilizer for a given resin. The present trend is towards the development of a single polyfunctional stabilizer that can halt or retard as many as possible of these breakdown mechanisms.

Nitrile Rubbers

(*Continued from page* 117)

cessing conditions. Values as low as —50° C. have been obtained in this laboratory, and, more recently, values of near —10° C. have been found on similar compositions.

Stabilization of the vinyl resin presents no unusual problems. The usual lead, sodium, and calcium salts are effective in protecting the compound against discoloration. Clear compounds are slightly yellower than those obtained with the best monomeric plasticizers.

Nitrile rubbers are vulnerable to oxidation, so they must be protected by an antioxidant. When vinyl-nitrile rubber compounds are exposed to sunlight or artificial weathering conditions, they discolor and stiffen more rapidly than other vinyl compounds. Antioxidants are not effective in retarding this degradation.

Processing methods

Thin film samples were prepared for this investigation from solutions of resin and rubber in methyl

ethyl ketone. Nitrile rubber which could be dissolved without breaking down on a mill was chosen. Some grades of nitrile rubber, however, require a mill breakdown in order to effect solution without gel formation.

When processing without solvent, it is customary to blend liquid plasticizers with the vinyl resin powder before fluxing. This method, however, is not possible with nitrile rubbers in slab form. Several different processes have been employed. Perhaps the best method for most plants is to band the rubber on a cold mill, and add the vinyl resin which, at this stage, acts as a filler. When completely dispersed without fluxing the resin, the batch may then be transferred to a hot mill.

A somewhat similar result can be obtained by charging the entire batch to a cold Banbury mixer, and mixing for 5 to 7 min. with very light pressure on the ram and cold water in the jacket and rotors. When the batch is fluxed, the cold water is shut off, low pressure steam is turned on, and the ram pressure is increased. The batch should then be dropped at approximately 135° C. Final plasticization and development of maximum tensile strength can then be accomplished by processing on a hot two-roll mill.

Fluxing the resin first, and then adding nitrile rubber is not recommended unless a small amount of liquid plasticizer is used in the resin or a soft vinyl resin is employed. Fluxing unplasticized polyvinyl chloride, or copolymer containing more than 95% polyvinyl chloride may be injurious to equipment bearings and develops temperatures which degrade the compound.

In order to simplify compounding and to reduce the number of unplasticized resin particles, nitrile rubber latex has been coprecipitated with vinyl resin emulsion or suspension. The result is an intimate mixture of the two components in a convenient form

Comparison of Vinyl Resin Compounds

Plasticizer[a]	*NR*	*DOP*
Parts per 100 vinyl resin	84	43
Tensile strength, p.s.i.	2,500	3,000
Elongation, %	330	250
Elongation at 1,000 p.s.i., %	45	40
Hardness, Durometer A	80	83
Stiffness, p.s.i.		
At 25°C.	2,500	1,650
At 0°C.	90,000	28,000
At −25°C.	320,000	200,000
Brittle temperature, °C.	−40	−14

[a] NR=Nitrile Rubber; DOP="Flexol" Plasticizer DOP (diethylhexyl phthalate).

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for further compounding. In addition to improving the dispersion of resin, another advantage is realized. The addition of resin to the nitrile rubber makes it possible to coagulate, wash, dry, and store rubbers with low viscosity, which would be too soft to handle in slab form.

In calendering vinyl-nitrile rubber blends, lower temperatures are recommended than for other vinyl compounds. Higher temperatures cause trouble with creping, a defect attributed to cross linking of the rubber. Stearic acid, in amounts from 0.5 to 1.0 parts per hundred of vinyl resin, is satisfactory as a lubricant.

Some grades of nitrile rubber cannot be calendered smoothly. However, when nitrile rubber with a viscosity of 20 is used, lower calendering temperatures can be employed, and smoother sheets are obtained than when 90 viscosity material is used.

Vinyl compounds plasticized with nitrile rubbers have been satisfactorily extruded. Optimum temperatures vary too much with conditions to make specific recommendations practical, but, in general, the temperatures of the extruder should be kept 5 to 10° C. lower than for compounds with ester type plasticizers. Calcium stearate is a satisfactory lubricant. Tubing extruded with a 0.010 in. wall thickness is readily blown to a wall thickness of 0.002 inch.

Acknowledgments

The author is indebted to many others in this laboratory for information on which the foregoing is based. Particular credit is due Dr. W. J. Jebens for the results on cast films, to Mr. P. H. Hunter for calendering information, and to Mr. G. G. Himmler for general properties of vinyl-nitrile rubber compositions. The cooperation of the Enjay Co., Inc., The B. F. Goodrich Co., and the Goodyear Tire and Rubber Co. Inc., in supplying samples and offering suggestions is gratefully acknowledged.

Equation Errata

The author of the article "Autographic Method for Measuring Stiffness of Nonrigid Plastics," MODERN PLASTICS, Sept. 1949, has just called our attention to two manuscript errors in equations published with that article. Equation (1), page 118, should be corrected to read

$$E = \frac{L^3}{3I} \times \frac{P}{\delta}$$

Equation (8), page 164, should read

$$E' = \frac{L^3}{3I} \times \frac{M_1}{\left[\frac{V}{96K} - M_2\right]}$$

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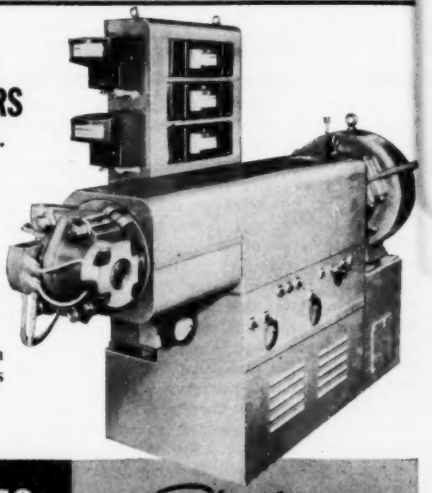

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THE PLASTISCOPE*

INTERPRETATIONS OF THE CURRENT NEWS

By R. L. VAN BOSKIRK

Phenolics still brighter

IT is a pleasure to report an error like the following:

Last month in this column, after telephone interviews with various raw material producers, we estimated phenolic molding powder production for the last five months. Now, after a re-check, we find that our figures were extremely conservative.

August phenolic molding powder sales ran up to 8,900,000 lb., and September should go over 10,000,000. It is very possible that October figures will show a sales rate of more than 15,000,000 lb., in comparison to our estimate of between 10 and 12,000,000. This would be operating at a rate comparable to 1947, the best year the phenolic molding industry ever had in volume consumption.

At the time of going to press, it looks as though November and December consumption and sales of phenolic molding powder might come close to October; but any estimate for these two months is conditional upon how fast all industry can recover from the steel and coal strikes.

Polyethylene film

A GREAT future is anticipated for polyethylene film in the packaging industry. Today's interest in this film is probably as high as in any product in the plastics industry but, like most other plastics, polyethylene is no miracle material. Certain factors will have to be taken into account by producers who expect to market it. For example, we have a letter from a reader who states that after he had developed a machine to slit and stretch polyethylene film, his supplier changed his method of extrusion to the inflated-tube type. The user had to change suppliers because he could no longer stretch the inflated-tube type polyethylene on his particular machine since by the particular inflated-tube method used, the molecules were oriented at right angles to the axis of the tube.

A packaging engineer tells us that in comparing the water vapor transmission rate of coated cellophane and polyethylene, a 2-mil polyethylene film is sometimes required in contrast to thinner cellophane where the wvt rate is dependent upon the coating rather than upon the thickness of the cellophane. We have been informed, for example, that a polyethylene inner wrap for cereals would have to be over 2 mils thick to achieve a wvt rate comparable with the coated cellophane or glassine currently in use. On the other hand, a polyethylene film can be creased, scored, folded, or otherwise fabricated for packaging without losing any of its wvt properties.

Film transmits gas—In the vegetable and fruit packaging fields, polyethylene permits transmission of carbon dioxide and oxygen gas to a greater degree than cellophane and so helps prevent certain forms of spoilage. The packaging experts have found that each type of vegetable or flower requires different treatment, and it is probable that various types of plastics may be suitable, according to the particular need of the product to be shipped.

Anyone considering the use of polyethylene should also remember that if he is using high-frequency sealing methods, he will probably have to change his present equipment in order to handle polyethylene and that the problems of adhesion and printing are still far from whipped.

There are literally scores of interesting angles in this polyethylene film business that require careful examination by anyone who wishes to use it. Although it is true that there are a few problems involved in polyethylene adaptations, the ways of overcoming them are being rapidly found as industry gains experience. For example, kraft paper coated with polyethylene has been found satisfactory in many instances where a paper backing allows a thin film to be used as a barrier and provides it with additional tensile strength.

Other than on a cost basis, there are no jobs that polyethylene coated paper can do that the film cannot. Multi-wall bags and fresh meat wrappers are examples.

On the other hand, polyethylene film by itself has such good transmission for certain organic vapors that its use helps to prevent rancid odors in certain commodities, for the gases pass off much more readily than when the material is packed in waxed papers.

Polyethylene is also being used to upgrade certain waxes where it gives added gloss and seal strength.

Bags go into Banbury—The use of 3-mil polyethylene film bags for packaging carbon black is one of the applications that has been receiving a tremendous ballyhoo, but which, despite all talk, is scarcely beyond the experimental stage. The theory is to ship carbon black to the rubber manufacturers in polyethylene bags so that it can be dumped into the Banbury, bag and all. The polyethylene has no effect on the rubber mix, and since the bag never has to be opened, there would be no carbon black dust floating all over the place. Other chemicals used in rubber production, such as magnesia oxide, are also being tested for this type handling.

Producers say that the cost of carbon black shipped in these bags would average about ¼¢ more per pound. Experiments are also under way using S-polymer film for bag material.

The carbon black bags contain either 25 or 50 lb. per bag, and last year 848 million lb. of carbon black were used by the rubber industry; but it is probable that no more than half of this amount would ever be shipped in bags since the bagged material is used largely as stand-by supply in the big rubber tire plants which generally handle their carbon black in closed conveyor systems.

Film association

CERTIFICATE of incorporation was filed recently by the Printed Plastic Film Assn., Inc., formed for the purpose of promoting fair competition, establishing ethical practices in the printing and processing of plastic film and similar materials industry, and of promoting friendly relations and good-will among the members of the association and between members and their customers.

The incorporators and the present directors of the association are:

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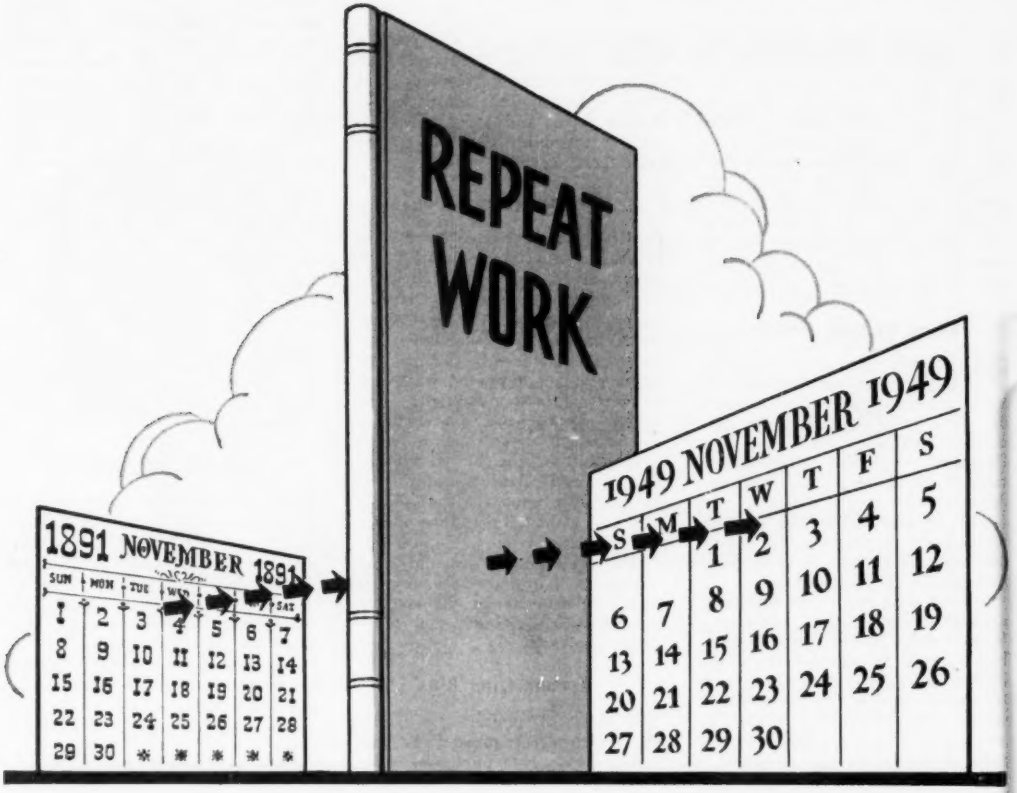

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Sales training course

BEGINNING of the fourth phase of the Dow Styron program with a training course on plastic products for store sales personnel was announced recently by The Dow Chemical Co. The presentation, tailored to fit chain, variety, and department training sessions, will consist of sound slide film in color and will be produced in two parts, according to Donald L. Gibb, sales manager of the Plastics Div.

The training course is developed around three major sequences: What is polystyrene?; how to recognize it; how to care for it. Selling information and display ideas form the second part of the presentation, which will be made available to stores prior to or during their Styron promotions.

Latest consumer promotion by Dow for department stores is a Plastic Center exhibit supplied by the company and staffed with consumer product consultants from its merchandising section. The idea is to acquaint customers with plastic products, their use and care. This Center sets a pattern for the store's own plastics sections in housewares department.

Butyrate price down

PRICE reduction of from 1¢ to 3¢ per lb. for Tenite II cellulose acetate butyrate molding compound has been announced by the Tennessee Eastman Corp., Kingsport, Tenn.

Belting

MEN'S vinyl belts in a new line of surface patterns and colors have been made available by Leatherplast Mfg., Inc., 18 Main St., Newark, N. J. Made from B. F. Goodrich Chemical Co.'s Geon, the belts are available in all types of finishes generally associated with belting and come in 12 colors in ¾ and 1 in. widths. They are packed in display boxes and are expected to sell for approximately $1.00 at the retail level.

Casting composition

RECENTLY developed by Furane Plastics and Chemicals Co., Glendale, Calif., a new casting composition employs substantially amino-resins as binders. Called Calcerite-A, it supplants standard Calcerite manufactured by this firm and offers a much improved water resistance, greater strength, and longer working life. The material is furnished in an opaque white powder but may be colored by various dyes and pigments. Addition of an activator converts the powder to a heavy, though pourable, dough-like consistency.

Greatest use of the material is expected in hard, durable forming tools and patterns for the machine shop, foundry, and material fabrication processes.

A roar from Rio

A PLASTICS importer in Brazil has figuratively jumped down our throat for an item published in the September Plastiscope referring to the Companhia Nacional de Tecidos Nova America as the first calenderer of vinyl film in Brazil. Our correspondent, C. J. M. Toone, who represents B. F. Goodrich Chemical Co. and other U. S. plastics resin and machinery producers in Brazil, states that Plasticos Plavinil S/A has been in the business of calendering film from Geon resin for several years. He also states that another firm in Rio de Janeiro has been extruding polyethylene film for a considerable length of time.

In summing up the plastics situation in Brazil, Mr. Toone states that his own company services 14 extrusion plants with from two to seven machines each in all branches of thermoplastics but mostly specializing on vinyl. Among these extruders are seven wire coaters who coat all type of wire from thin magnet wires up to underground cables. One of the firms is now setting up an extrusion machine for polyethylene tubular film up to 100 in. in circumference. Another company is extruding vinyl for upholstery and embossing it, with a quality job that compares favorably with calendered stock. Still another firm is extruding polyethylene monofilament for weaving into seat covers for automobiles and furniture. These monofilaments are also woven with Geon filaments in an experimental development that looks most promising.

With reference to Mr. Toone's comment about Brazil's progress in plastics, it is interesting to note from Government export figures that Brazil is truly one of the greatest users of plastics raw materials from the United States. Among other countries importing our plastics materials in April, May, and June of 1949, Brazil was the leading importer of cellulose acetate (239,000 lb.); second in urea (317,000 lb.); fourth in polystyrene (759,000 lb.); and ranked fifth in vinyl (491,000 lb.)

Flexible polyester

GENPOL polyester resin A-20 is a new straight unmodified polyester resin of the flexible type announced by The General Tire and Rubber Co., Akron, Ohio. Characterized by a low degree of molecular unsaturation, the resin features low heat of reaction and is highly fluid in nature. It can be used for both casting and laminating applications, either alone or in conjunction with polyesters of the rigid type.

Because Genpol is supplied in unmodified form, it must be mixed with styrene monomer before use. The ratio of styrene to polyester determines the physical properties of the finished cured copolymer. It may be formulated to produce either tough, hard products, or flexible soft materials.

Toy promotion

NATIONAL promotion of plastic toys by Monsanto Chemical Co., Springfield, Mass., included a full page ad in the *Sat Eve Post* of Nov. 19. The company is providing merchants with store displays which include trims for windows and counters, easel mounted reprints of the *Post* ad, and additional ad reprints for elevators and interior displays.

The current *Monsanto Plastics Merchandiser* features information on more than 1000 plastic toys.

The company is also supplying without charge Lustrex labels for

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No. 5012—A quick-curing, all-around varnish for paper or canvas. Can be substituted for cresol-type materials. Good mechanical and electrical properties.

No. 5013—With high strength papers, produces laminates with 35,000 to 40,000 lbs. tensile strength at 150 to 250 psi. Useful for paper face sheeting and bag molding, and in the manufacture of plastic-faced plywood.

No. 5014—Quick, deep penetration and good flowing properties make this grade highly suitable for Compreg production. Widely used in filler sheets for decorative laminates.

No. 5015—A water-soluble liquid resin, ideal for the production of water-resistant laminates of wood, canvas, asbestos, etc. Also widely used as a binder in the production of rock wool insulation.

No. 5025—Very fast curing. Imparts excellent water resistance. Used extensively in the manufacture of odorless refrigerator breaker strips.

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National Conference, S.P.E.

The National Society of Plastics Engineers will hold its 1950 conference at the Hotel Carter in Cleveland, Ohio, on Jan. 11, 12, and 13. Mario J. Petretti, Rogers Plastics Corp., West Warren, Mass., is national president of the Society.

More than 700 leading plastics experts from the United States, Canada, and Mexico, are expected to attend the conference, which will feature the presentation of 20 papers on original research in the plastics industry. These discussions of new developments and manufacturing techniques, as well as new uses for plastics, may determine future trends in the plastics field, according to Mr. Petretti.

Richard L. Huber, Hercules Powder Co., president of the Cleveland-Akron Section of the Society, host to the meeting, has been named conference chairman. Honorary chairman is Thomas E. Orr, Plastic Engineering, Inc., life member of the organization.

products tested and approved by its Evaluation Committee. Merchandising aspects are considered, as well as technical evaluation, on applications submitted by Monsanto customers to the Evaluation Committee.

Glass fabric

ANOTHER glass fabric, said to possess the softness, feel, and drape of silk, is now in production by Waterway Projects, Inc., Hollywood, Calif. The developer states that it is both fire and flame-resistant and moth and mildew-proof, is washable and dries in 20 min. with no need for ironing, and is completely fade-proof. The "Soft-Flex" fabrics are said to retail at as low as $3.00 a yd. in 50-in. widths. Two distinct decorative weaves are available—a crepe and a herringbone. Continuous production methods, developed at the same time as the process itself, assure identical color from one end of a piece of yard goods to the other, regardless of length, according to the producer.

Heat and light stabilizers

FOUR new stabilizers have been announced by the Ferro Chemical Corp., Bedford, Ohio. The first is a barium salt heat stabilizer, No. 100, which is generally used in combination with one of the company's light stabilizers. It is recommended to help give improved heat sealing and printability to vinyl film.

Stabilizer No. 301 is a lead salt heat stabilizer for use where optical clarity is not required. It is free from the orientation and surface effects sometimes encountered with the stearates.

Stabilizer No. 361 is a lead organo-silicate heat stabilizer also recommended for use where optical clarity is not required.

Stabilizer No. 541, a sodium organo-phosphate composition, is primarily a light stabilizer which combines the advantages of both the organic and inorganic type of phosphate. It is claimed to be an excellent heat stabilizer as well as light stabilizer.

Quartermaster Corps business

PERSONS or firms interested in participating in Quartermaster Corps business may be interested in the "Memorandum to Industry" issued periodically by the New York QM Purchasing Office and mailed to all responsible firms who request it.

As a service to business men interested in learning how to sell to any of the Armed Forces, the Department of Defense recently established a Military Procurement Information Center at the Pentagon, Washington 25, D. C., where inquiries may be made by mail, telegraph, telephone, or personal visit.

Plexiglas VS

COMPLETING the line of "V" grade acrylic injection molding powders is Plexiglas VS recently announced by Rohm and Haas Co., Philadelphia, Pa. This is a general-purpose, soft-flow formulation and is said to offer exceptional moldability coupled with the same water-white clarity as characterizes the company's heat-resistant Plexiglas V and medium flow Plexiglas VM. The new material is available in commercial quantities.

British chemical-plastics meeting

THE Plastics and Polymer Group of the Society of Chemical Industry will hold a 3-day symposium in London in September 1950 under the title "Polymer Chemistry as Applied to Plastics." It is intended that the contributions shall be planned as far as possible to bridge the gap between those engaged in theoretical studies and those concerned with industrial applications. Further information about the symposium will be published at a later date.

Those who wish to make a contribution are requested to communicate with the Honorary Secretary for the symposium, Dr. N. J. L. Megson, Advisory Service on Plastics and Rubber, Ministry of Supply, R.716, Shell Mex House, London, W.C.2.

Polyethylene film producer

QUANTITY production of extruded polyethylene film is now underway at the Gering Products, Inc., plant at Kenilworth, N. J. Eight extrusion machines are available for use, and two more 10-in. machines will soon be added.

A new sales division which will concentrate on the packaging field is being set up by the company to handle polyethylene.

Formica movie

A NEW color motion picture illustrating Formica, its manufacture and uses is now offered for free showing before interested groups through 12 company offices of The Formica Co., Cincinnati, Ohio. Producer of the film, "Living With Formica," was Max Lasky. The only requirements for showing are a 16-mm. sound-on-film projector, and

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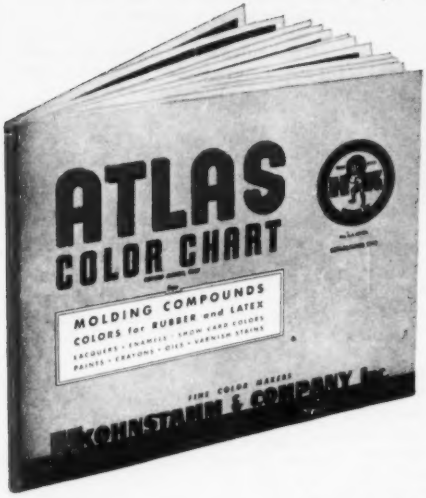

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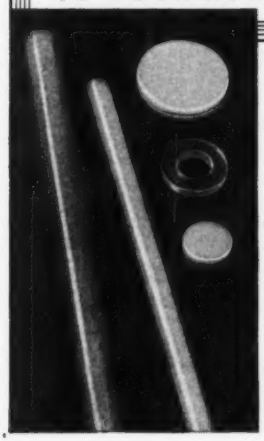

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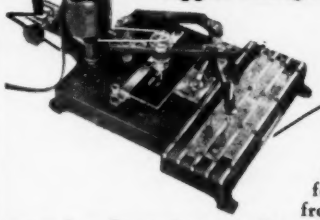

The Green Engraver offers great speed and convenience. Quickly cuts up to four lines of letters from 3/64" to 1" on curved or flat surfaces whether made of metal, plastics or wood . . . operates by merely tracing master copy — *anyone* can do an expert job. Special attachments and engineering service available for production work. Just the thing for radio, electronic apparatus and instrument manufacturers. Write today for Bulletin MP8.

For *quality* engraving on

- Panels
- Lenses
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- Instruments

. . . also does routing, profiling and three dimensional modeling.

**Price does not include master type and special work holding fixtures.*

GREEN INSTRUMENT CO.
387 Putnam Ave., Cambridge, Mass.

THE PLASTISCOPE

the services of an operator. Running time is 25 minutes.

DOP improvement

PRODUCTION of a new low-color dioctyl phthalate has been announced by Tennessee Eastman Corp., Kingsport, Tenn. Both a plastic and an electrical grade are offered having a maximum APHA color rating of 50. The company asserts that this is the first time specifications have been published which guarantee such excellent color characteristics.

Industrial tape

ALL pressure-sensitive industrial adhesive tapes made by Bauer and Black, Chicago, Ill., will henceforth be known as Polyken Industrial Tape. For example, the firm's electrical adhesive polyethylene tape, which is used in place of splicing tapes or compounds covered with friction tape, will be called Polyken #822.

The change has been made to establish a clearer distinction between Bauer and Black's surgical dressing business and its industrial tape program which utilizes entirely separate sales and distributing organizations.

The company, which was started in 1939 with two products and one salesman, now has a wide range of tapes and expects its 1950 production figure to exceed the 1947 figure by 60 percent.

COMPANY NEWS

Synthane Corp., Oaks, Pa., has moved its Chicago sales offices to larger quarters and a more convenient location at Morton Grove, Ill.

Owens-Corning Fiberglas Corp., Toledo, Ohio, has announced new branch sales office managers as follows: **Harold D. Bates**, New York, N. Y.; **Russell R. Galloway**, Chicago, Ill.; **John J. Hartnett**, Detroit, Mich.

E. W. Bliss Co., 1420 Hastings St., Toledo 7, Ohio, has announced a deferred payment plan for its machinery. Buyers may now elect to defer payments over a period of from 1 to 3 yr. by making a 25% initial payment. Interest is charged at 6% only on the unpaid balance. There are no financing charges.

United Engineering and Foundry Co. is erecting a modern research laboratory costing about $125,000 at its Canton, Ohio, plant to further its research in iron castings and rolls for the steel, non-ferrous, rubber, plastics, and paper industries.

Celluplastic Corp., 50 Avenue L, Newark 5, N. J., has announced that its Clearsite plastic containers are available at worthwhile savings as compared with prices in former years. Production savings are due to new equipment and processes, which have also resulted in new decorative effects. The containers may be had in mottled, pearl, tortoise shell, and metallic finishes in a complete range of colors. They are also available in crystal clear and opaque finishes in a complete range of colors.

Industry is invited to send samples of its products to Celluplastic to be returned in Clearsite containers, complete with cost and other data.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., has appointed **Dr. L. P. Moore** as manager of its New Products Development Dept., and **Dr. E. W. Cook** as its European technical representative.

Universal Plastic Corp. has set up a plant at 61-65 S. Pennsylvania Ave., Wilkes-Barre, Pa., for the fabrication of table cloths, aprons, shower curtains, raincoats, etc. from vinyl film. The company has purchased 12 Mayflower continuous rotary bonding machines and 6 bar seal machines, more than half of which have already been delivered to its plant. President of the new firm is **Frank Blakeslee.**

Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y., has announced the creation of a new post for **Jesse S. Young** as assistant to the president, supervising Eastern sales. **Charles Gardner** has been named Eastern field sales manager, under Mr. Young.

Doughboy Industries, Inc., New Richmond, Wis., has appointed **Monroe Greenthal Co., Inc.**, New York and Los Angeles, to direct the advertising, publicity, and merchandising of its Doughboy Vinylite Plastic Toy Div. The initial campaign on the inflated toys will include trade paper, newspaper, magazine, and television media.

Stricker-Brunhuber Corp., 19 W. 24th St., New York 10, N. Y., has increased its personnel and equipment and is offering expanded services on its injection, compression, and transfer molds, and metal, plastic, and wood models. By making its own patterns, the firm also claims to be in a position to expedite deliveries of its cast cavities and forces in stainless steel or beryllium copper.

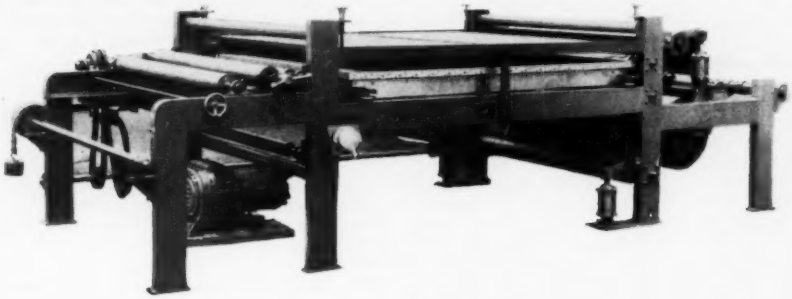
The Baldwin Locomotive Works, Philadelphia 42, Pa., has purchased the press business of **Defiance Machine Works, Inc.**, Defiance, Ohio. The transaction includes all models of Defiance preform presses, along with original drawings, other engineering data, and accessories for specialized applications. The Defiance preform presses will now be manufactured under the Baldwin-Defiance name at the Baldwin Eddystone, Pa., plant, and will be sold through the Baldwin district sales offices.

The purchase provides Baldwin with an established line of small mechanical presses to supplement its existing line of presses. Baldwin is one of the country's largest manufacturers of standard and custom-built hydraulic presses, which range from 50 to 12,500 tons or more in capacity.

Republic Molding Corp., 4641 Lexington St., Chicago 44, Ill., is transferring its operations to a new building at 6475 N. Avondale Ave. which will double its present capacity. The enlarged molding facilities will include compression as well as injection molding. According to present plans, a construction program next Spring will again double the company's capacity.

Reichhold Chemicals, Inc., Detroit, Mich., and **Diamond Alkali Co.**, Cleveland, Ohio, have announced they will cooperate in the further development of Reichhold's phenol operation in Tuscaloosa, Ala. The physical assets and operation of the plant will be transferred to a new Alabama corporation, on which Diamond has acquired an option to purchase a one-half interest. Diamond Alkali has entered into a financial

For Vinyl or Polyethylene Embossing



For embossing film *free of tension* — radiant black heat prepares the film for cold setting in the cooled embossing rolls — requiring smaller diameter engraved roll.

Substitution of a rubber covered backing roll for the conventional paper roll allows the use of any number of engraved roll patterns — yet requires but one rubber roll.
Write for full details.

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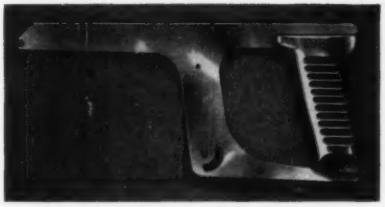
Designers and Builders of: Treaters • Gummers • Laminators • Crepers • Air Dryers • Waxers • Coaters • Festooners • Saturators • Printers • Embossers • Winders and Special Machinery for Paper Converting.

What Happens When Plastic "Marries" Steel?

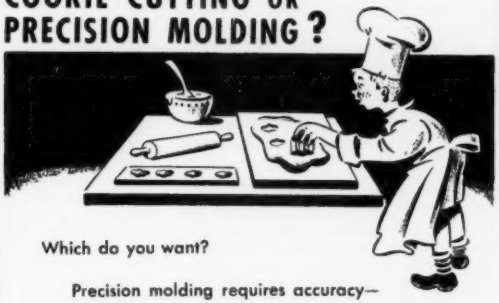


Hacksaw users say this cellulose acetate handle *molded-on* a Millers Falls Tool Co. hacksaw frame eliminates separation, twisting, cracking, rotting . . . lengthens saw life. Also protects enclosed steel from rust and dirt . . . cleans easily . . . withstands hammer blows!

Send blueprint or sample for quotation on any difficult molding problem — including plastic-on-metal "marriages" by Kirk.

F. J. KIRK Molding Co. CLINTON, MASS.

COOKIE CUTTING OR PRECISION MOLDING?



Which do you want?

Precision molding requires accuracy— experience — engineering — high technical skill — complete "know how" to design your piece, work out your problems, produce your piece to your complete satisfaction.

On the other hand, cookie cutting — well!

PLASTIC MOLDING CORPORATION
Custom Molders · Precision Molders
Sandy Hook Connecticut

Cold Mold • Hot Compression • Plunger Transfer • Injection

THE PLASTISCOPE

arrangement with Reichhold which will provide funds for the extensive modification and improvement of the processes principally employed at the Alabama plant, which was built by Reichhold in 1943 at a cost of $3,500,000. It utilizes the sulfonation process. **P. J. Ryan,** Reichhold vice-president and general manager at Tuscaloosa, will continue to direct the operations of that plant.

Creative Design Associates has opened its new laboratory and development offices at 18 W. Passaic St., Rochelle Park, N. J.

Imperial Plastic Co., 240 Central Ave., Newark, N. J., molder of plastic combs and novelties, has opened a sales office and warehouse at 815 E. 14th Pl., Los Angeles, Calif.

Manco Products Co., 2401-2409 Schaefer Rd., Melvindale, Mich., producer of Tru-Cast beryllium copper cavities for plastic molds, has announced the appointment of **Darrell Van Buren** as district manager for New England, with offices in Walpole, Mass. The company has opened a new office at 291 Delaware Ave., Buffalo, N. Y. The office will be headed by **Joseph P. Healey** as district manager for the state of New York with the exception of metropolitan New York City.

The Russell Manufacturing Co., Middletown, Conn., has established a branch manufacturing plant at Lexington, S. C., for the production of nylon and narrow cotton elastic fabrics. The new plant is the second to be established in the South and the third to be acquired by the company within recent weeks.

Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio, has announced that the responsibilities of **Whiting N. Shepard,** general sales manager, have been broadened to include direction of all sales activities of the organization. **Horton Spitzer** has been appointed to a newly created post of director of Eastern promotional sales and will re-establish his headquarters in New York, N. Y.

E. Davis Caldwell, who has been coating compound sales representative in the Pittsburgh territory, has joined the molding compound sales group in Toledo, where he will assist the sales manager and carry out special assignments.

Koppers Co., Inc., Pittsburgh, Pa., recently announced administrative changes making **Fred Denig,** vice-president, manager of its Production Dept., and **Dr. G. Frank D'Alelio** vice-president and manager of the Research Dept., the position formerly held by Mr. Denig. **Hugh C. Minton,** vice-president who has headed up the Production Dept., has resigned because of ill health.

Mr. Denig joined Koppers in 1921 and has been a vice-president and manager of its Research Dept. since 1934. Dr. D'Alelio joined Koppers in 1947 as an assistant manager of the Research Dept. and, at the age of 40, holds 269 patents, most of which are in the field of high polymers or plastics. He was formerly director of the General Electric Co.'s plastics laboratories and was vice-president in charge of research for the Pro-Phy-Lac-Tic Brush Co. for a period of two years.

Hercules Powder Co., Wilmington, Del., has announced the transfer of **Fred K. Shankweiler,** who has been manager of the Cellulose Products Dept.'s New York office for the past two years, to Wilmington where he will be supervisor of chlorinated products.

James R. Yeager, who has been lacquer marketing supervisor in Wilmington for the past five years, has been named to succeed Mr. Shankweiler in New York.

The Formica Co., Cincinnati, Ohio, has retained **Brooks Stevens,** industrial designer, to aid in the development of new applications for Formica materials, as well as additions to the company's more than 40 decorative color patterns.

The Bloxolite Co. of America, producer of Bloxolite, a translucent plastic partition and ceiling block, has become a part of the new **Plastics Div.** of **Hachmeister, Inc.,** Pittsburgh, Pa., manufacturer of Hako asphalt floor tile and plastic wall tile. The new Plastics Div. will merchandise to all building markets both Hako plastic wall tile and the plastic Bloxolite decorative block.

R. G. Brown, former president of the Bloxolite Co. and originator of Bloxolite, has joined Hachmeister as sales manager in charge of the Plastics Div. He has also been president of the **Pittsburgh Plastic Tile Co.**

PERSONAL NEWS

Albert J. Gottlieb has resigned as secretary and general manager of **E. B. Kingman Co.,** Leominster, Mass., and has joined **Commonwealth Plastics Corp.,** Leominster, as vice-president and general manager.

Carl E. Holmes, owner and general manager of **American Plastics Engineering Corp.,** Detroit, Mich., has been appointed manager of manufacturing of the **Plastics Div., General American Transportation Corp.,** Chicago, Ill.

Charles W. Kleiderer has been appointed sales manager for **Arnold Brilhart, Ltd.,** Mineola, N. Y. Mr. Kleiderer was formerly sales representative for **The Glenn L. Martin Co.** in the New York area and during the war was with the Office of Scientific Research and Development where he assisted in developing the plastic components of the proximity fuse.

Arthur Smith, Jr. has been appointed director of public relations of **The Dow Chemical Co.,** Midland, Mich., including all of its divisions and subsidiaries. The former Editorial Service Dept. will also be integrated under Mr. Smith's direction, and a general broadening of activity is planned. Mr. Smith has been with Dow for 12 years, the last five of which were spent in its Magnesium Div.

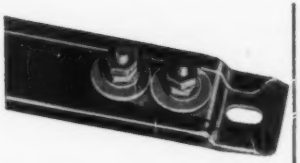
George W. Whitehead has been named sales manager of the **Plastic Molding Machinery Div., Improved Paper Machinery Corp.,** Nashua, N. H., according to **Walter L. Barker,** president.

Mr. Whitehead has been associated with the company for five years in developing, servicing, and selling Impco plastic molding machinery. Prior to his service with Impco, he was with **Monsanto Chemical Co.** and **Hercules Powder Co.**

John C. Seager has been appointed sales manager in charge of packaging for **Amos Molded Plastics,** Edinburg, Ind. His headquarters will be

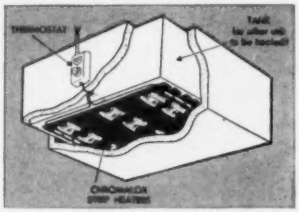
CHROMALOX offers you efficient and economical *Packaged Electric Heat*—to fit your specific needs

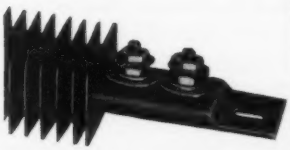
CHROMALOX Electric Heaters give dependable "on-the-spot" heat where and when heat is needed. They produce uniform and accurate temperatures with automatic or manual control. Low initial cost, low installation cost and low operating costs are among the other advantages they give you.



CHROMALOX STRIP HEATERS

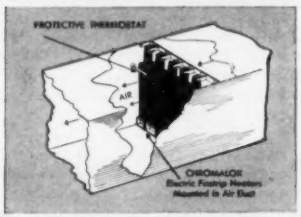
Easy-to-install CHROMALOX Strip Heaters are clamped to flat or curved surfaces, round vats, pipes and tubes. They are made in straight lengths, rings and segments . . . and may be curved or bent to fit cylindrical or "dished" surfaces. Typical applications include: armatures, cleaning tanks, molds, process kettles, plating baths, revolving rolls, etc.

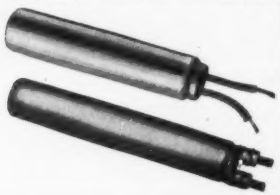




CHROMALOX FINSTRIP HEATERS

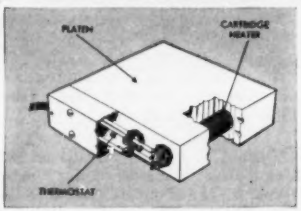
Finstrip Heaters are used for drying, curing, space heating and other applications requiring heated air under forced circulation. Air and gases are quickly and easily heated; uniform operating temperatures up to 750°F. are accurately maintained by thermostatic control. Finstrips, designed for minimum turbulence, are well suited for use in air-ducts.

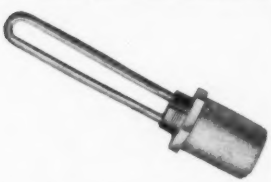




CHROMALOX CARTRIDGE HEATERS

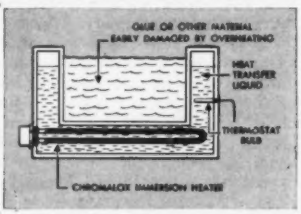
Compact CHROMALOX Cartridge Heaters are ideal for use when concentrated heat is needed. Inserted into close-fitting holes, they provide easily controlled heat for dies, molds, platens, etc. They are quickly and easily installed in stationary or moving parts with minimum labor and material costs; they may be controlled for accurate, dependable, care-free operation.





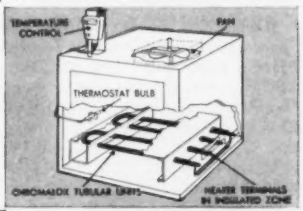
CHROMALOX IMMERSION HEATERS

CHROMALOX Immersion Heaters are used in degreasing, cleaning, pickling and plating baths; for melting greases, asphalts and similar viscous fluids; for heating Dowtherm, Arochlor, Prestone, and other heat-transfer mediums. Available in many sizes and types, with alloy sheaths to resist corrosive action.


OIL OR OTHER MATERIAL EASILY DAMAGED BY OVERHEATING
HEAT TRANSFER LIQUID
THERMOSTAT BULB
CHROMALOX IMMERSION HEATER

CHROMALOX TUBULAR HEATERS

These heaters, in straight or tailored shapes are used for convection, conduction and radiant heating. They may be clamped to metal surfaces, used in ovens, or immersed in greases. They are especially useful to heat ovens, calenders, molding-presses and similar equipment utilizing heat.



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IC-42

THE PLASTISCOPE

in the company's newly opened New York office at 7 E. 42nd St.

Paul C. Grimes has been named sales manager of **G. S. Blodgett Co., Inc.**, Burlington, Vt., manufacturer of industrial ovens.

Dr. R. A. V. Raff, a specialist in high polymer research, has been appointed to a new fellowship on plastics established in Mellon Institute by Koppers Co., Inc.

Dr. J. A. Almquist has been elected president and a director of **The Celastic Corp.**, Arlington, N. J., succeeding **A. E. Pitcher**, who resigned on Sept. 30.

William P. Gobeille has been appointed superintendent of the Milwaukee, Wis., plastics plant of **Nash-Kelvinator Corp.** He joined the company last year as assistant manager of the plastics plant.

W. R. Smith has been named sales manager of the **Mat Div., Glass Fibers, Inc.**, Waterville, Ohio.

Arnold E. Pitcher retired on Oct. 1 as general manager of the **Plastics Dept., E. I. duPont de Nemours and Co., Inc.**, after serving nearly 40 years with the company. While he reached the retirement age of 65 last June, he remained on active duty at the company's request while arrangements were made for combining the Plastics and Ammonia Depts. into the new Polychemicals Dept. A resumé of Mr. Pitcher's career was given in the June 1949 issue of MODERN PLASTICS.

Marius Van de Weghe has been appointed superintendent of the **Plastics Div., Colt's Mfg. Co.**, Hartford 15, Conn. He was formerly chief chemist of the company's Plastics Chemical and Testing Laboratory.

T. Norman Willcox has been named manufacturing and materials engineer of the **Laminated and Insulating Products Div., General Electric Co.**, with headquarters at Coshocton, Ohio.

Donald L. Weir, formerly sales manager, **Plastic-Coated Tubing Div., Samuel Moore Co.**, Mantua, Ohio, has been appointed sales manager of **Decorative Laminates Plastics Div., Continental Can Co., Inc.**, Cambridge, Ohio.

A. Myles Younger has been elected vice-president in charge of sales of **Atlas Mineral Products Co.**, Mertztown, Pa.

M. Adolph Heikkila, formerly associated with **The New Jersey Zinc Co.** where he handled public relations activities for that company's luminescent pigments and other new products, has formed his own public relations consulting service at 35-15 91st St., Jackson Heights, L. I., N. Y.

Sam Kostolefsky, formerly president and general manager of **Kosto Hobby Crafts Plastics Corp.**, Washington, D. C., has been appointed sales manager of the **Arts and Crafts Div., Polyplastex United, Inc.**, 92-35 Horace Harding Blvd., Elmhurst, N. Y. Mr. Kostolefsky is bringing out the company's new line of Decorator Lamp Shade Kits for the hobbycraft trade.

Paul E. Fina has been named sales engineer of **Fiberite Corp.**, Winona, Minn. Mr. Fina, with headquarters at 330 S. Wells St., Chicago, Ill., was formerly district sales engineer of the **Plastics Div., The Drackett Products Co.**, and prior to that was with the **General American Transportation Co.**

Dr. Charles Allen Thomas has been elected chairman of the five-man executive committee of **Monsanto Chemical Co.** Dr. Thomas, one of the key figures in the development of atomic energy, and past president of the American Chemical Society, has been executive vice-president of Monsanto since May 1947.

James Dunn has been promoted to general plant superintendent, **Molding Div., C. F. Church Mfg. Co.**, Monson, Mass.

Floyd J. Gunn has been named head of coatings sales of the **Plastics Div., The Dow Chemical Co.**, Midland, Mich., replacing **C. Benson Branch**, who was recently named manager of the firm's Technical Service and Development Div. Mr. Gunn was formerly with the Dow Chicago office where he was supervisor of plastics sales for that territory.

James W. Birch, Jr. has been appointed general manager of **Dussi-Wallace and Co.**, 60 E. 42nd St., New York 17, N. Y., exporter of plastics raw materials. Mr. Birch was previously management engineer at the Philadelphia Navy Yard.

Egmont Arens, New York industrial designer, has been elected president of the **Society of Industrial Designers** for the coming year. He succeeds **Harold Van Doren** of Philadelphia, Pa.

B. L. Batty has been appointed technical director in charge of sawdust board and adhesive development of **Rock Island Millwork Co.**, 2525 Fourth Ave., Rock Island, Ill.

Frank G. Helander has been appointed executive vice-president of **Watson-Stillman Co.**, Roselle, N. J.

Deceased

John J. Noble, 56, vice-president of **Vulcanized Rubber & Plastics Co.**, 261 Fifth Ave., New York, died Oct. 2 in Massillon, Ohio.

MEETINGS

Dec. 4-7—Annual Meeting, American Institute of Chemical Engineers, Pittsburgh, Pa.

Jan. 16-19 — Plant Maintenance Show, Auditorium, Cleveland, Ohio. First show and conference devoted exclusively to maintenance problems.

Feb. 27-March 3—Committee Week and Spring Meeting, American Society for Testing Materials, Hotel William Penn, Pittsburgh, Pa.

March 2-4—1950 Spring Conference, Pacific Coast Section of The Society of the Plastics Industry, Inc. Hotel Del Coronado, San Diego, Calif.

March 28-31—National Plastics Exposition, Navy Pier, Chicago. Restricted to trade only.

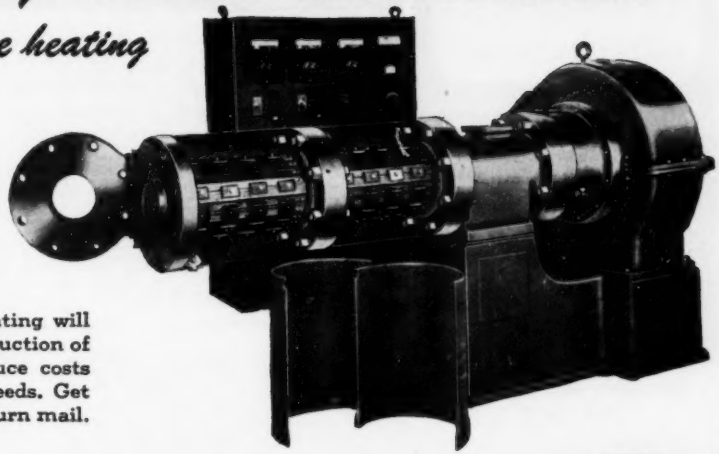
S.P.E. Meetings

Dec. 12—Upper Midwest Section of S.P.E., 6 p. m. at Coffman Memorial Union, University of Minnesota. William Wall of E. I. du Pont de Nemours & Co., Inc., will speak on nylon.

Dec. 14—South Texas Section of S.P.E. Annual business meeting.

Electrically Heated EXTRUDERS

for accurate zone heating



CLOSE CONTROL by zones makes it possible to select the correct heat for the plastics being extruded and to hold it uniformly along the screw—there are no hot spots. For straight line production electric heating will help you turn out more production of higher quality and to reduce costs accordingly. Outline your needs. Get NE recommendations by return mail.

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INJECTION-COMPRESSION
MOLD IT BETTER FASTER
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TRANSFER
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Considerate and experienced handling of your plastic molding problems is available thru our accurate service, where you will find ample facilities to meet your every plastic molding requirement . . . at maximum efficiency and economy.
Accurate invites your toughest problems . . . send your specifications now . . . no obligation.
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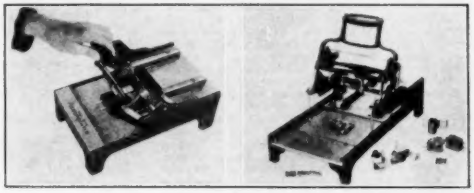
ELECTRIC BRANDERS

for plastic or wood

PRINTING MACHINES

hand or power models for printing plastic products

All of these items are made by ACROMARK



This roll type ACROPRINTER was built for printing small plastic parts such as tags, coasters, dice, poker chips, crystal holders, etc.

The ACROMARK Company

365 Morrell St.
Elizabeth 4,
New Jersey

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Up to 60 words	$ 7.50
Up to 60 words (boxed)	15.00
Up to 120 words	15.00
Up to 120 words (boxed)	30.00
Up to 180 words	22.50
Up to 180 words (boxed)	45.00

For further information address Classified Advertising Department, MODERN PLASTICS, 122 East 42nd St., New York 17, New York

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EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

Machinery and Equipment FOR SALE

12 AUTOMATIC PHONOGRAPH RECORD PRESS UNITS Hydraulic Baldwin Southwark 50 ton automatic tilting head press serial #45580. Taylor Flex-O-Timer No. 179RJ311, 23 x 40 steam plate and double shelf table, (1) 1¼" hydraulic high and low air diaphram valve, (2) ¾" hydraulic air diaphram valves, (1) Vickers high and low pumping unit, 5 H.P. motor, regulating valves. 70 gallon tank, and cooling system. Price $1800.00 HYDRAULIC SAL-PRESS CO., INC., 386-390 Warren Street, Brooklyn, N. Y.

SAVE WITH GUARANTEED REBUILT EQUIPMENT-HYDRAULIC PRESSES: 26" x 24", 13" ram, 400 tons; 36"x36", 19" ram, 425 tons; 24"x42" 340 tons, 2-12" rams; 34"x40" 22" ram, 475 tons; 26"x24", 13½" ram, 800 tons; 24" x 24" 18" ram, 318 tons; 24" x 24", 12" ram, 170 tons; 42" x 42", 16" ram, 250 tons; 36" x 52", 14" ram, 385 tons; 36" x 36" 12" ram, 141 tons; 24" x 26", 10" ram, 118 tons; 20" x 20", 10" ram, 118 tons; 18" x 24", 10" ram, 78 tons; 22" x 15", 8" ram, 75 tons; 15"x15", 8" ram, 75 tons; 12"x12", 7½" ram, 50 tons; 12"x12", 6½" ram, 42 tons; 8"x9½", 4½" ram, 20 tons; 16"x16", 3½" ram, 12 tons; Laboratory press 30 tons 6"x6"; NEW DUAL PUMPING UNITS, ALL SIZES; Worthington Triplex 12 gal. 2200#, 4 plunger 6 gal. 2000#; Watson Stillman duplex box type 1 gal. 2500#; Worthington 1 gal. 10000#; NEW LABORATORY 6"x12" M. D. MILLS; Thropp 16" x 40" M. D. MILL; EXTRUDERS, NRM size 1½" and 2½" Units; PREFORM MACHINES; Stokes R&T, Colton 5 & 5½ T, 2 Stokes DDS 4 with Reeves Drives. Mixers, Accumulators, Vulcanizers, etc. UNIVERSAL HYDRAULIC MACHINERY COMPANY, 285 Hudson Street, New York City 13, N. Y.

FOR SALE: Farrell 18" x 45", 16" x 48" & 15" x 36", 2 roll Rubber Mills. New Lab. 6" x 12". Other sizes 30" to 84". Royle #2 Perfected Extruder, and other sizes. 500 ton Hydr. Molding Press 42" x 48". Field 500 ton 25" x 30". Francis 200 tons 24" x 18". Albert 100 ton 2 opening 24" x 24". 40 ton Broaching Press. Also presses 20 to 500 tons from 12" x 12" to 36" x 36". Watson-Stillman Hor. 4 plgr. 1" x 2" x 4" H. & L. Pressure Pump. HPM 1¾" x 6" vertical Triplex 10 GPM 2700 lbs. 7 Hydr. Oil Pumps, Vickers, Oilgear, Northern, etc. Elmes 1" x 4" & 1½" x 4" hor. 4 plgr. 5 to 8 GPM 4500 lbs. & 5500 lbs. Elmes 2" x 6" hor. 30 GPM 2500 PSI. Rumsey 4½" x 8" vert. Triplex 65 GPM 900 lbs. Elmes 2½" x 4" hor. 17GPM 850 lbs. Hydr. Steam Pumps. Low pressure Pumps 150 to 600 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses. Stokes Rotary Preform Tablet Machines 1 3/16", 1¼" and ⅝", also single punch. Colton #3½ T Preform Tablet Machine 3" dia. tablet. Injection Molding Machines 2 oz. to 28 oz. Baker Perkins Jacketed Mixers 200, 100, 50, 9 & 0.7 gals. capacity. New and used Rotary Cutters. Rubber Mills, Calenders, Banbury Mixers, etc. Heavy duty Mixers, Grinders, Pulverizers, Gas Boilers, etc. PARTIAL LISTING. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 90 WEST STREET, N.Y. 6, N. Y. WOrth 2, 5745.

FOR SALE: 100 Ton and 50 Ton Stokes Molding Press & Pumps; 300 Ton Dunning & Boschert, Molding Press; 300 Ton W. S. New Hobbing Press; 750 Ton Southwark Hobbing Press; 300 Ton W. S. Press 24 x 20 Platens; 175 Ton H. P. M. 30 & 30 Platens; 85 Ton Stewart Bolling 20 x 20 Platens With Electric Plates; 50 Ton 18" x 18" Elmes, With Electric Plates, Handpump Operated; 500 Ton Waterbury Farrel 3 Post Press; 800 Ton Waterbury Farrel 22" x 24" Platens; Stewart Bolling 50 Ton 14" x 14" Platens; 35 Ton Oilgear Shaft Straightener 34" Long Bed; Carver & Watson Stillman Lab. Presses; Hydro Pneumatic & other type Accumulators; Piston & Oil Pumps. AARON MACHINERY CO., 45 Crosby St., N.Y.C.

FOR SALE—Used Machinery, Compression Molding Presses—Laboratory size up to 600 Tons; Injection Molding Machines—1 oz. to 22 ozs; Plastic Extruders 1" to 4½" diameter; Compounding Rolls; Scrap Grinders. Preform Machines—complete equipment for making Molding Powders and for all kinds of Plastic Molding. What do you need? CONSOLIDATED PRODUCTS CO. INC., 13-14 Park Row, New York 7, N. Y.

HYDRAULIC PRESSES REBUILT TO SPECIFICATIONS for plastic items, industrial purposes and phonograph record presses. We have in the used equipment (1) Baldwin-Southwark 8" x 8 ft. stroke, 2000# W. P. weighted accumulator $1000, (1) French Oil 3" x 42" stroke, 2500# W. P. weighted accumulator $600, (1) 400 ton, 32 x 45, 18" ram, 36" stroke, 12' daylight $2200, (1) 300 ton 30 x 46, 18" ram, 24" stroke, $1800, (1) 400 ton 22 x 30, 16" ram, 18" stroke, 36" daylight $1500, (2) 150 ton 42 x 46, 19" ram, 36" stroke, 60" day-light $900 each, (3) 24 x 24, 250 ton Southwark Presses with push-backs, 15½" ram, 15" stroke, 33" daylight $7450 each. Hydraulic Sal-Press Co. Inc., 386-90 Warren Street, Brooklyn 2, New York.

FOR SALE—One new H. K. Porter #8 72" diameter double end cone blender, stainless steel with foundation supports and 5 HP gear head, magnetic brake drive motor. Never removed from original crate. Purchased late 1947. To be sold to highest bidder F.O.B. Kearny, N. J. We reserve right to reject any and all bids. Forward bids in duplicate to Western Elec. Co. Inc., 100 Central Ave., Kearny, N. J. Att: Purchasing Dept.

FOR SALE: 3 Roll Plastic Calender, size 22" x 60". Condition very good. Rolls may be inspected. Reply Box C1117, Modern Plastics.

FOR SALE

New England manufacturer offers one No. 1 Royle plastic extruder, 2" screw.

Oil heated, no oil heating unit.

7½ H.P. Vari-speed drive,

220 volts, 3 phase, 60 cycles.

In new condition.

May be inspected by appointment.

Price $2,000.00 F. O. B.

Reply Box C1123, Modern Plastics.

FOR SALE
2 Cavity Hanger Mold
Sample on Request
Write:
Mr. Rosenbach, 220 5th Ave., New York

For Sale: (2) 200-250 Ton Stokes Compression Molding Presses with Controls and Butane Boiler
(2) 150-250 Ton Stokes Compression Molding Presses with Controls and Butane Boiler.
(1) 50-250 Ton Stokes Compression Molding Press with Controls and Butane Boiler.
(1) Model "R" Stokes Preform Press.
(2) Model "S" Westinghouse 2KW-40.9 Megacycle Electronic Preheaters.
Reply Box # 32 Spring Valley, Illinois

16-OUNCE HPM INJECTION MOLDING MACHINE complete with hydraulic power dual circuit operating system, temperature control, and spare cylinder. Recent model, Reply Box C1125, Modern Plastics.

STOKES ROTARY 16 PUNCH PELLET PRESSES. Heavy duty double arm jacketed mixers 25 gal., 100 gal., 250 gal. PERRY EQUIPMENT CORP., 1529 W. Thompson St., Phila. 21, Pa.

FOR SALE: Injection presses: 2, 4, 6 & 8 oz Reeds, 4, 7 & 12 oz HPM, 6 & 8 oz Lester, 6 oz Watson, 1 oz vertical NRK. Extruders: 1½", 2½" NRM, 4½" oil heat. Royle, Pelletizer, Ovens, Granulators, Tumbling Barrels, Temperature Circulators. Apex rd. obj. print. mach. Preco Labpress .1—as new—Laminating Press 10 op. 30" x 30" Pl.—1—150 tons Compress. Presses. Colton 5½T, Kux No. 50 single punch. Kux No. 25 rotary Preformpresses. Icecube Cup and Drawerpull used Inject. molds. JUSTIN ZENNER, 833 W. Sheridan Rd., Chicago 13, Ill.

FOR SALE—Stromes Electric Oven, AC-DC, 1320 watts. Size: 17" x 24" x 27". Used 4 months. To 400° F. Thermostat controlled. Price: $75.00, Reply: Boruski, 505 5th Ave., New York 17.

PRESSES:
5 Watson Stillman 50 ton 8" ram 15x15 platens, 5 Adamson 75 ton 10" ram 20x20 platens, 4 Baldwin Southwark 12" chrome plated rams, 24" stroke, 2 opening steam plates 20x20, 150 ton @ 3000psi. Baldwin Southwark 18" ram 2 opening 24x24 steam plates 24" stroke, 375 ton @ 3000 #psi.

TABLETTING PRESSES:
6 Stokes Model T Single punch 12 ton Size 1½" max depth of fill 1½", 50 to 70 tablets per min. complete with Reeves variable sp drive.

PUMPS, HYDRAULIC:
Baldwin Southwark Triplex 1x4 4gpm 2500#wp. Waterbury Farrell Triplex combination high low 1½x3 4gpm @ 6000#, 2½x3 18gpm @ 600#wp, Elmes 9AX Horizontal duplex 40gpm @ 600#wp. Robertson 4 Piston 1¾x5-15gpm @ 6500#psi, New Vickers V104, V105, V157 & 2500 variable delivery 300gpm. @ 2500#psi. Others — Sump, Vacuum, Rotary Gear, Centrif, Etc.

ACCUMULATORS:
Baldwin Southwark weighted type 7x7 new chrome plated ram. Cap. 14 gals @ 2500#psi. Elmes Hydro-pneumatic 40 gals for 600#psi.

LOWEST PRICES—TIME PAYMENTS—TRADES REBUILT—GUARANTEED KODY ENGINEERING CO., Trenton, N. J.

8 OZ. INJECTION 2 CAVITY MOLD, household hanger, for sale. Practically new. Original price $3,800. Samples available on request. For further information, write to:

Simon Rosenbach
220 Fifth Avenue
New York City

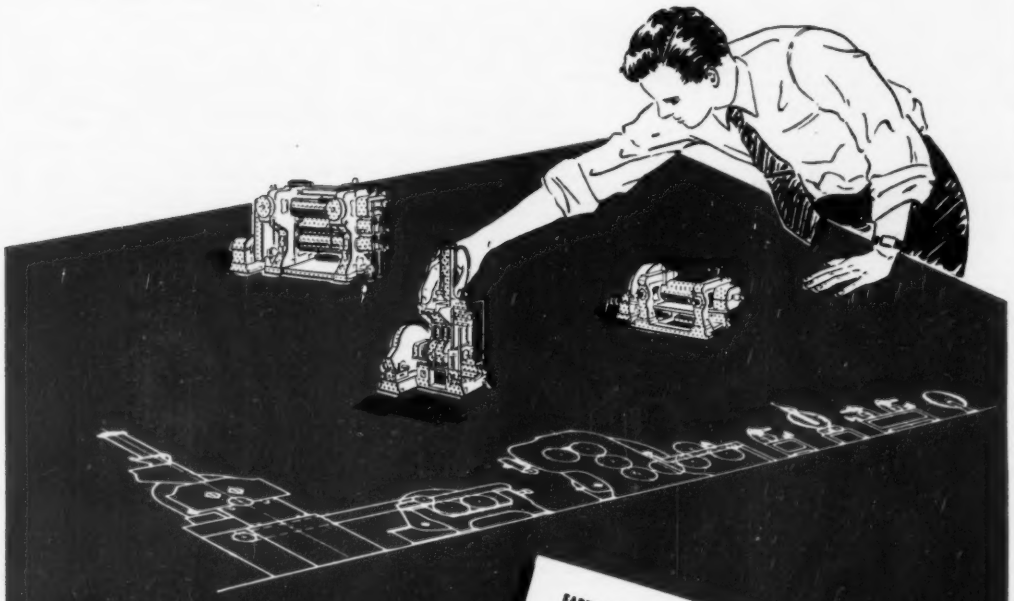
(*Continued on page* 180)

HERE'S WHY ENGINEERED LAYOUTS CUT PROCESSING COSTS

When your processing setup is laid out by Farrel-Birmingham engineers, each machine is *matched in capacity* with the other units in the production line.

This assures free-flowing production without costly interruptions caused by the "choking" or "starving" of some of the units. You receive maximum return on your investment because *all* machines are working full time, at capacity.

Another advantage of such an *engineered* layout is the reduction in the manual aid and supervision required. In some cases an individual machine will require no operator at all.



For further details of this engineering service, as well as a brief outline of Farrel-Birmingham equipment, send for new bulletin No. 187. Just fill out the coupon and drop it in the mail.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn.; Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Please send me, without cost or obligation, a copy of Bulletin 187, "F-B Machinery for the Process Industries".

Name .....

Company .....

Address .....

City ..... State .....

MP

CLASSIFIED ADVERTISING

(*Continued from page 178*)

Machinery and Equipment FOR SALE

FOR SALE: Reed-Prentice 10A-1oz. injection molding press, Mfd. Nov. 1939. Serial #16470. Complete with motor and new Bristol controls and oil. Price $2,950.00. Reply Box C1139, Modern Plastics.

FOR SALE: Gorton 3-U Pantograph, Mfd. May 1942. Serial #16413. Complete with copy holder, grinder, depth gauge and 10 sets of type. Machine and equipment in excellent condition. Price $1,175.00. Reply Box C1140, Modern Plastics.

Machinery Wanted

WANTED—Electronic heat sealer. Output 2KW to 3 KW. Input 220 Volts 60 cycles AC. State condition, age, make, model and best cash price. Reply Box C1130, Modern Plastics.

WANTED—F. J. Stokes 15 or 30 ton completely automatic molding press. Reply Box C1128, Modern Plastics.

MANUFACTURER WILL PAY CASH for injection machines, molds, extruders, grinders, other plastics machinery. Give make, size, serial numbers, age, condition, where located, price, all in first letter. Reply Box C1115, Modern Plastics.

#235 and #200D3 Stokes Automatic Molding Presses wanted by electrical manufacturer. Please write Box C1121, Modern Plastics.

WANTED: 8" x 16" four roll plastic Calender. Write giving conditions of machine and price. Reply Box C1118, Modern Plastics.

WANTED: One HP or larger at 900 RPM Herringbone Reducer, 9 to 1 reduction. Must be in good condition and reasonable. Reply Box C1142, Modern Plastics.

Material For Sale

PLEXIGLAS
.060 Clear 15¾ x 20¾"
First Quality MASKED Original Cases
Case Lots—250 Sheets—38¢ sq. ft.
Larger quantities at further reduced prices.
ARISTOCRAT PLASTICS, INC.
55 Clarkson St., New York 14, N. Y.
WAtkins 4-4216

FOR SALE—20,000 lbs. white, virgin butyrate material, Tenite II, Soft Flow. Will sell all or part, attractive price. Write Box C1138, Modern Plastics.

TRANSPARENT SHEETING—
29¢ Per Lb.
Special offer—subject prior sale—8,000# Plax .010 polystyrene sheeting in rolls 20" wide, in original factory packages—29¢ per lb.—Wire or phone Mr. Gaymann. Interstate Folding Box Company, Middletown, Ohio.

PLEXIGLAS SHEETS
For Sale
#260 Green Masked Both Sides
42" x 40" x .125 Original Pack
MORE THAN 1/3 SAVING
$.72 per sq. ft. in case lots, f.o.b. St. Louis
(Approximately 800 sq. ft.)
KELLY & COMPANY
2007 Olive Street St. Louis 3, Mo.

HERE IS VALUE
PHENOLIC ROD & TUBE

Quan.	Size	Color Grade	Price
	ROD		
958'	¾" x 36"	Natural CO	.61 ft.
136'	¼" x 36"	" CO	.17 ft.
	TUBE		
3817'	11 16"O.D. x 9/16"I.D.	Nat. XX	.11 ft.
197'	13 16"O.D. x 9/16"I.D.	" XX	.13 ft.
180'	5 16"O.D. x .187"I.D.	" CO	.17 ft.
96'	3 8"O.D. x 3/16"I.D.	" CO	.17 ft.

CHECK THE SAVING
KELLY & CO.
2007 Olive Street St. Louis 3, Mo.

BELOW MFR'S COST!
Cast Lucite Rod 1¾" Dia.
Cast Lucite Tube 2" O.D. x 3/16" Wall
Extr. Lucite Tube 5/16" O.D. x ⅛" I.D.
HOUSE BEAUTIFUL PLASTICS
814 MILWAUKEE AVE. MO 6-8271
CHICAGO 22, ILL.

Help Wanted

PLASTICS ENGINEER WANTED—Large New England injection and compression molder seeks engineer with experience in all technical phases of injection and compression molding. Must be able to follow a job through from preliminary design to mold design. Knowledge of molding procedure, cycles, etc. required. Send complete resume and salary requirements in first letter. Reply Box C1119, Modern Plastics.

WANTED: Supervisor for plastic decorating familiar with all methods of decorating, including silk spray, masking, printing, etc., for a large manufacturing company. Must also be capable of estimating quantities. When replying please state all qualifications including age, experience and education. Reply Box C1120, Modern Plastics.

WANTED, GRADUATE ENGINEER with minimum of five years' experience to head Plastics Laboratory devoted to design of parts, mold design and selection of proper plastic materials. Should also have working knowledge of all phases of engineering and materials other than plastics. Excellent opportunity for advancement. Reply Box C1085, Modern Plastics.

WANTED: PLASTIC DESIGNER with wide experience in injection molding. One that can create and design new items. Must have wide experience in the application and characteristics of plastics. Applicants must submit a complete resume of their employment background, outlining in detail such experience that they feel particularly qualifies them for this position. Great opportunity for advancement. State salary desired. Reply Box C1143, Modern Plastics.

Situations Wanted

SALESMAN, 29, married, car, interested in representing manufacturer of consumer items for retail and chain stores, or finished products and raw materials for sale to commercial and industrial users. Thoroughly experienced in all phases of plastics. Excellent following in Philadelphia, Baltimore, Washington, and South Jersey areas. Salary or expenses, plus commission. Reply Box C1124, Modern Plastics.

MECHANICAL ENGINEER, Industrial Engineer, young, creative, practical. Desires to learn Plastics Business, start at bottom. Offers ability to create marketable ideas.
Reply: S. Messeri
251 W. 92 Street
New York 25, New York

EXTRUSION EXPERT, outstanding in die design and set up work on all types of extrusion materials and shapes. Eight years experience as supervisor in extrusion, during this period having set up two complete plants, designed all accessory equipment and machinery. Only firms looking for grade A man need answer. Reply Box C1116, Modern Plastics.

LAMINATION, EXTRUSION, AND COATING, TECHNICAL DIRECTOR. PLASTICS AND SYNTHETIC RUBBERS. PRODUCTION AND DEVELOPMENT. Ph. D. IN CHEMICAL ENGINEERING. REPLY BOX C1126, MODERN PLASTICS.

MAN AVAILABLE. 15 years practical experience in injection molding as foreman, superintendent, plant manager, etc. Extensive experience in instructing new help, plant layout and setup, maintenance, mold design, etc. Best of references from leaders in the plastics business. Reply Box C1141, Modern Plastics.

Lines Wanted

SALESMAN, experienced manufacturers' representative for the Metropolitan New York area is open to represent an established manufacturer of novelties, utility items, or toys to the chain, variety, department stores, jobbers, and exporters. Reply Box C1129, Modern Plastics.

MANUFACTURERS REPRESENTATIVE wants consumer items competitively priced. Now calling on 300 jobbers and resident dept. store buyers of housewares, toys, hardware and drug sundries in Manhattan. Reply: Boruski, 505 5th Ave., New York 17.

Miscellaneous

INJECTION MOLDS DESIGNED
Specialized Engineering and Designing of Injection Molds
Estimates Cheerfully Made
A. J. Simons,
Registered Mechanical Engineer,
R. F. D. 1, Polk, Penna.

WANTED: Plastic Scrap. Rigid Vinyl, Cellulose Acetate, Polystyrene. Custom grinding, magnetizing and X-raying. Compounding time available. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. Es 5-7943

(*Continued on page 182*)

Never Before . . .

DESIGN SILVER DEPOSITION ON POLYSTYRENE

The lovely sterling silver designs which G.M.C. deposits on the polystyrene handles of this Briddell Carving Set, make it an outstanding sales leader from coast to coast. The decorated set now outsells the undecorated model.

Not until recently has G.M.C.* been able to offer you electro-deposition of sterling silver on polystyrene. But now, with a further refinement of the G.M.C. Process†, which can design deposit silver on any plastic, we can *permanently* deposit any design on your polystyrene articles, upgrading both their appearance and the price you can sell them for.

Let us show you

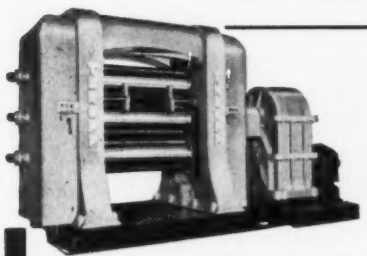
Today, send us a sample of one of your polystyrene products. We'll deposit a silver design on it and return it promptly. Then you can judge for yourself.

G.M.C. PROCESS CORP.

Manufacturers and Decorators in Electro Deposition of Metals

46 Great Jones St., New York 12, N. Y.

†*Patent pending* **No connection with General Motors Corp.*



Thropp Newly Designed Heavy-Duty Calenders

. . . for Plastics, Available in Three and Four Roll Types

Illustrated above is the latest Thropp 24" x 66", 3-roll (or 4-roll) heavy duty Calenders.

Some of the outstanding features included in these new calenders are: direct drive, eliminating master gear and pinions; roll necks mounted on self-aligning roller bearings; circulating roll neck lubrication which will withstand exceptionally high temperatures; all cut herringbone tooth gears; enclosed, roll adjusted mechanism; ease of control and minimum maintenance. For full details, send for specification folder.

- *West Coast Rep.:* **H. M. Royal, Inc., Los Angeles, Cal.**
- *Export Agent:* **Steinhardter & Nordlinger, 185 Hudson St., N. Y.**

THROPP

WM. R. THROPP & SONS CO. Trenton, N.J.

If you use ANY thermoplastic film, or rigid sheeting, the

Thermatron

ELECTROPLASTIC SEALING SYSTEM

opens the way to better quality, lower cost and permits the manufacture of new improved items impossible of production by present and conventional methods.

The THERMATRON electroplastic sealing line is complete. Its design, construction and dependability have made it preferred equipment in hundreds of progressive plants the nation over — and in many foreign countries.

Standard units adaptable to almost any application — in stock for prompt delivery. From a single unit to an entire plant.

Send for folder L-9 — or better yet, describe your problem and send samples.

THERMATRON DIVISION

RADIO RECEPTOR CO., INC.

253 W. 19th Street, New York 11, N. Y.

CLASSIFIED ADVERTISING

(Continued from page 182)

Miscellaneous

MOLDS WANTED

Discontinued or obsolete molds in top condition for buttons, combs, brooches, soap boxes, bangles, cigarette holders, sun glasses, tooth brush handles, simple toys. Quote with samples in duplicate and state condition. Reply Box C1127, Modern Plastics.

FLEXIBLE MOLD MAKERS HANDBOOK brings your tool & die shop up-to-date with the latest information on new flexible mold materials and methods. Copies mailed postpaid for only $1.00. Reply: Boruski, 505-B Fifth Ave., New York 17.

SELL US YOUR PLASTICS or related manufacturing enterprise in whole or in part. Land, buildings and or equipment. Reply Box C1114, Modern Plastics.

WANTED: Low-cost closeouts, discontinued novelty consumer items. Advise quantity, original list and closeout prices. Reply Box C1122, Modern Plastics.

BRITISH MANUFACTURER desires to make an arrangement with either an American Manufacturer, Manufacturer's Agent or Business Consultant with a view to a regular exchange of ideas etc. to their mutual advantage. Write Mr. S. Stein, 23 Chadwick Road, Westcliff-on-Sea, Essex, England.

WANTED: PLASTIC Scrap or Rejects in any form. Cellulose Acetate, Butyrate, Polystyrene, Acrylic, Vinyl Resin, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding and magnetizing. Reply Box 318, Modern Plastics.

WANTED: Complete plants, also individual items such as: Mixers, grinders, 2-roll mills, extruders, etc. Reply Box C1019, Modern Plastics.

SALES REPRESENTATIVE WANTED to travel lower New England territory for custom plastic molder. Springfield, Mass. would be an approximate center of territory and it would be desirable, although not imperative, that representative base himself there. Company has established reputation, but would like close coverage in this territory. Reply Box C1131, Modern Plastics.

ATTENTION: MANUFACTURERS
Plastic Fishing Float — Patent Pending. When boat is anchored, float drifts with current. Sinker suspended just above bottom. Float shows if hook drags bottom, if water is too deep, if forward movement is stopped. When reeling in, float slides down line on pulley. Royalty basis. Reply Box C1132, Modern Plastics.

TO LEASE ON ROYALTY: rights on thin insert adjustable comb fitting in both types Gillette razors and most others, making a very efficient hair trimming device. Drawings mailed. Reply Box C1133, Modern Plastics.

PLASTIC FABRICATING MODERN PLANT IN OPERATION FULLY EQUIPPED — SUITABLE WOOD, METAL CENTRALLY LOCATED. WILL SACRIFICE. REPLY BOX C1134, MODERN PLASTICS.

WANTED TO CONTACT a manufacturer with medium to heavy manufacturing facilities to build and market a proven enclosed mixer used for the compounding of rubber and plastics. We know this machine to be a vast improvement over the compounder which is now used for this work. This will prove a profitable item to those who are now engaged in the manufacturing of rubber and plastics working machinery, and might round out your line of equipment. We know there is a receptive market. Reply Box C1135, Modern Plastics.

WANTED TO PURCHASE

Injection comb molds—one 5" pocket comb, one 7" comb, one 8½" ladies' comb, one rat-tail comb. Also wanted: one injection mold for toilet seats, one injection mold for sectioned cutlery trays, as well as other molds. State conditions and best cash price. Reply Box C1136, Modern Plastics.

FOR SALE

Injection Type Molds: one 8-cavity toothbrush container mold, one 6-cavity special designed beautiful Soap-Box, one 6-cavity Soap dish, one 4-cavity novelty item and one 4-cavity tumbler mold as well as several other molds. All molds to fit the 8-ounce Reed-Prentice or any other injection machine. Molds are guaranteed almost new and in perfect working condition for immediate possession. Reply Box C1137, Modern Plastics.

STAFLEX QMXA *and* OY

Vinyl Stabilizers

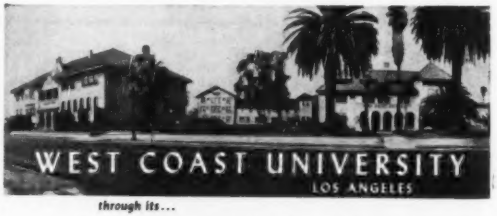
REDUCE PIGMENT FADE DURING PROCESSING

High efficiency at ALL TEMPERATURES makes practical
— Light Tints
— Wide Pigment Choice
— Minimum Color Variations

DEECY PRODUCTS CO.

120 Potter St. Cambridge 42, Mass.

STAFLEX-reg. U. S. pat. Off.



through its...

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offers the most modern training in Plastics Processing — beginning and advanced.

1 College level degree training in Mechanical Engineering with specialization in Plastics Processing.

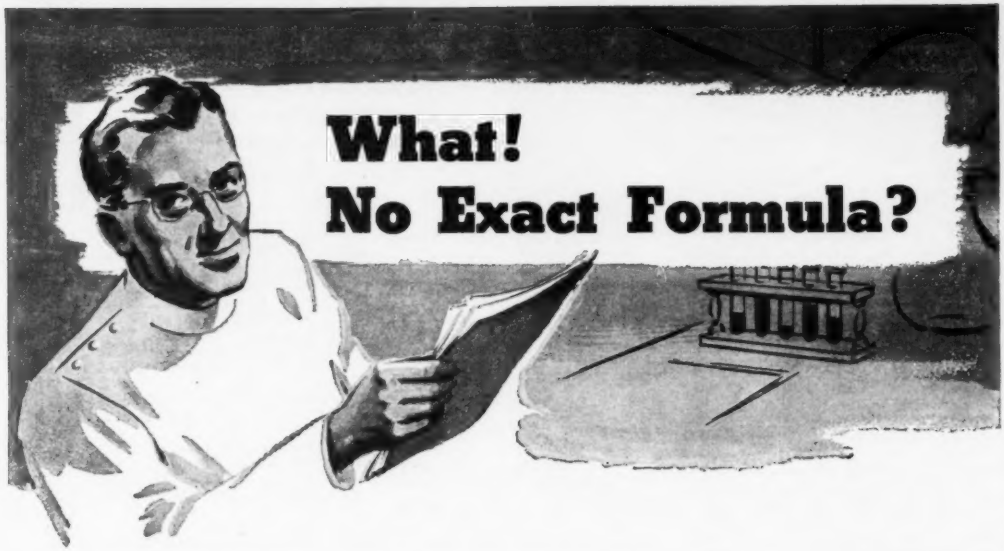
2 Resident training, intensive and practical — Plastics Fabrication — Plastics Technician.

3 Home Training, for up-grading plastics industry personnel or as preparation for worthwhile employment in the industry.

West Coast University invites the cooperation of the plastics industry in the continuing development and improvement of practical programs of plastics education and training.

INDUSTRY REQUESTS FOR TRAINED PERSONNEL GIVEN PROMPT ATTENTION

Plastics Industries Technical Institute
department of WEST COAST UNIVERSITY
1601 South Western Avenue, Los Angeles 6, California



NO, Doctor, there is no scientific laboratory formula for media selection. But experienced space buyers do have an effective and time-proven recipe for the profitable investment of advertising money—reasoning, judgement and experience PLUS THE USE OF FACTS. The basic advertising values of publications are reflected in the facts about their circulations. Also there are definite standards, mutually approved by buyers and sellers of advertising, by which circulations may be uniformly measured. Hence circulation facts, when reported in accordance with these standards, provide a dependable guide to sound advertising investments.

The information that makes it possible to measure advertising values based on circulation facts is given in the reports issued by the Audit Bureau of Circulations, a cooperative and nonprofit association of 3300 advertisers, advertising agencies and publishers. The Bureau has a staff of experienced, specially trained circulation auditors who make annual inspections and audits of the circulations of the publisher members. The factual data thus obtained is issued in the A.B.C. reports which are available to advertisers and agencies for use in comparing and selecting media.

Guesswork and waste in advertising are avoided when media is selected on the basis of the facts in A.B.C. reports. This business paper is a member of the Audit Bureau of Circulations. Ask for a copy of our A.B.C. report.

SEND THE RIGHT MESSAGE TO THE RIGHT PEOPLE

Paid subscriptions and renewals, as defined by A.B.C. standards, indicate a reader audience that has responded to a publication's editorial appeal. With the interests of readers thus identified, it becomes possible to reach specialized groups effectively with specialized advertising appeals.

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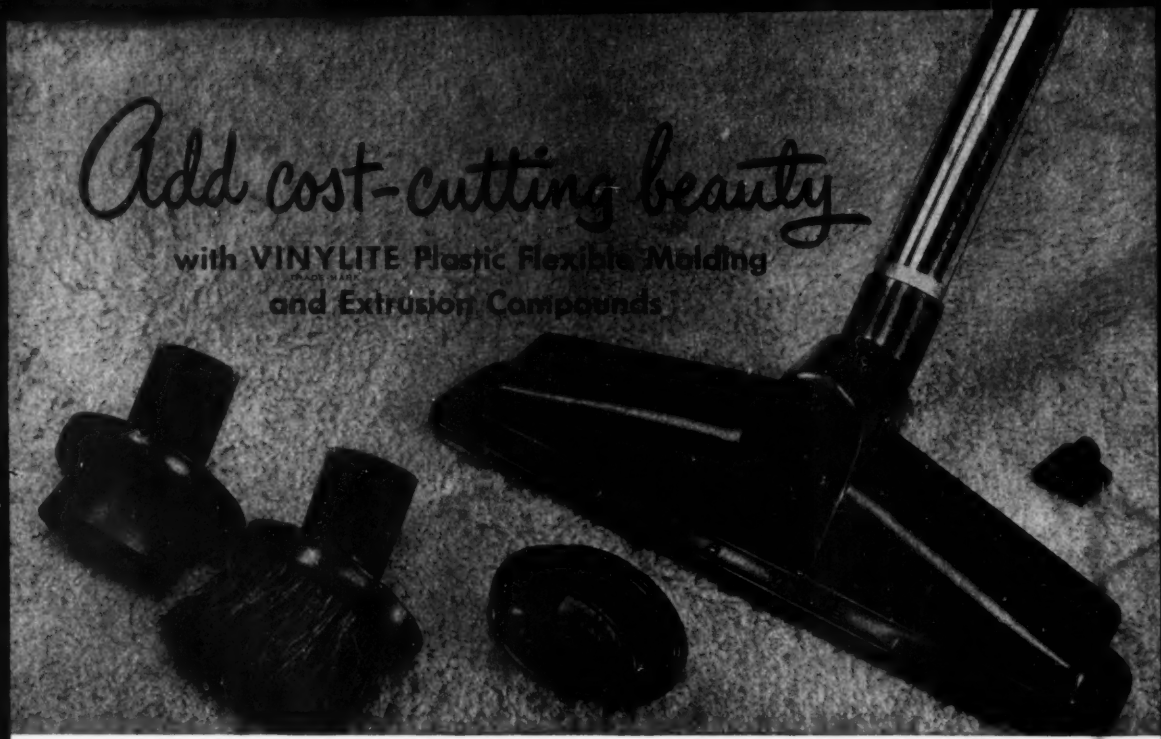

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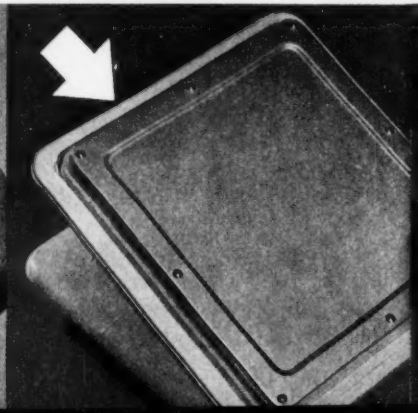

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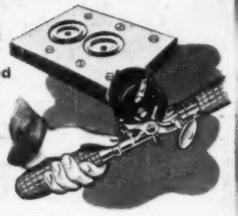
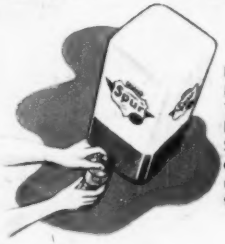
Paper cup dispenser, molded by General Electric for the Dixie Cup Company, Easton, Pa.

LOWER SELLING PRICE! The use of G-E plastics (instead of wood) for this television cabinet helps to make possible a low-priced set.

LARGE-VOLUME JOBS! G. E. is ideally equipped to mold large-quantity jobs—like parts for the Ocean City Manufacturing Co.'s surf casting reel.





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